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THE LONDON NATURALIST

Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 72 1993

Price £4

LONDON NATURAL HISTORY SOCIETY

The Society welcomes new members, both beginners and experts. Its Area lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society comprises Sections whose meetings are open to all members without formality. For those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology or rambling, there is a Section ready to help.

Publications

The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area, including records of plants and animals.

The *London Bird Report*, also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter, The London Atalanta* and the *Ornithological Bulletin*, are sent to members throughout the year.

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The Membership Secretary, L.N.H.S., P. C. Holland,
Flat 9, Pinewood Court, 23 Clarence Avenue,
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THE LONDON NATURALIST

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These, and back numbers of the *London Bird Report*, may be obtained from the Publications Sales Secretary, Mrs V. M. Friedman, 3 Chatsworth Gardens, West Harrow, Middlesex HA2 0RS. Reprints of the Index to *The London Naturalist* **32 – 51** are available for 25p post free. Reprints of the *Annual Rainfall Overlay, Master Grid Overlay, Habitat Overlay, Regolith Overlay, Air Pollution Overlay* and *Recording Areas Overlay* are free on receipt of a stamped addressed envelope.

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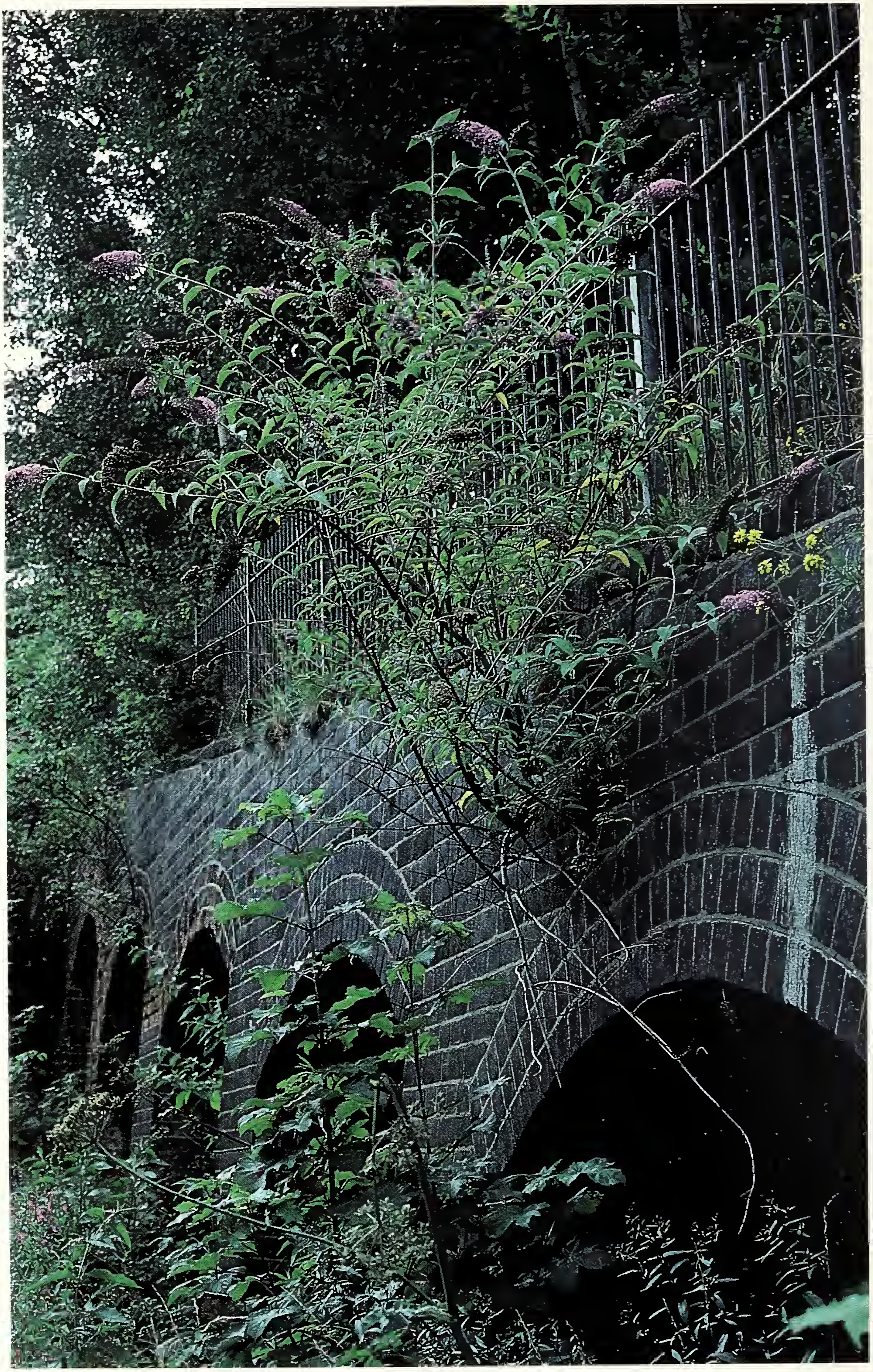

Buddleia on The Parkland Walk in north London, once a railway line, now the Capital's longest Local Nature Reserve.

The London Naturalist, No. 72, 1993 *Photo: David Bevan*

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THE LONDON NATURALIST

The journal of the LONDON NATURAL HISTORY SOCIETY

No. 72

for the year 1992

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Records may be sent to the appropriate recorder or to Colin Plant who will distribute to each recorder the relevant data from a mixed set of records.

Requests for information should be made to the appropriate recorder.

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Report of the Society for 1992

Presented at the Annual General Meeting on 14 December 1992

It is with deep regret that we have to record the deaths of H. J. Coombes and J. A. Woodley.

Your Council was pleased to send a card of greeting signed by many members of the Council, to Mrs L. M. P. Small, an honorary vice-president of the Society, on the occasion of her 85th birthday.

This has been an easier year for the administration of the Society; most vacancies have been filled, but a greater willingness by members to share the workload would be appreciated by many overworked officers.

Our publications continue to be both popular and successful. *The London Naturalist* No. 71 and the *London Bird Report* No. 56 have recently been sent to members. During the year your Council took the decision that *The London Atalanta* should be distributed to all members. Next year will see the publication of *Larger moths of the London Area,* edited by Colin Plant. Publication is scheduled for late spring and it is hoped there will be a pre-publication offer to members. The gathering of data for the *New atlas of breeding birds of the London Area* is now complete, but no publication date has yet been decided upon.

This year has seen our Society move closer to the London Wildlife Trust by sponsoring joint meetings; our president David Bevan has been co-opted to the council of LWT. The importance of conservation can hardly be exaggerated; your Council has decided therefore to appoint a conservation officer, and David Bevan has agreed to take on this post.

Until the recent publicity campaign, membership had remained fairly static, but since 1 October no less than 104 new members have joined the Society, following the special introductory offer of a copy of *The butterflies of the London Area* by Colin Plant. Total paid-up membership is 1,048 as against 1,081 last year.

The response to press advertisements featuring the offer was disappointing, but a distribution of posters and membership leaflets to public and college libraries proved much more effective. How much of this was due to the offer itself and how much to the fact that potential members had heard of us for the first time is impossible to say. The Society again took a table at the Annual Exhibition of the Amateur Entomologists' Society; our display stand was on show at Hounslow Public Library in October and then at the London Ecology Centre in November.

The Society has continued with its work on the long-term survey at Bookham Common in Surrey: results will continue to be published in *The London Naturalist.* The Society has also continued to support the work of the Dungeness Bird Observatory.

General and particular meetings both indoor and outdoor have been held. We hope that the varied programme offered provides both stimulation and pleasure to members and friends. Some of our Sections have had a difficult year, particularly Geology and Ramblers, where illness has hit key officers, but field meetings have been of much interest. The annual Parmenter Lecture was given by Mr Ray Softly — the text of the lecture was subsequently published in *The London Atalanta.* In addition the Ecology and Entomology Section arranged many field meetings as well as the annual joint meeting with the British Entomological and Natural History Society. The Botany Section also organized joint meetings with other natural history societies; these combined meetings provide opportunities to meet naturalists from other groups — we hope that other Sections will consider the idea of joint ventures. Workshops on mosses and chenopods were organized by that Section for whom David Bellamy addressed an interested gathering of LNHS members and friends.

Our South-West Middlesex Section was able to report an encouraging increase in attendances at its lectures and field meetings. Ornithology Section meetings too were well attended. Some members took part in the Wildfowl and Wetlands Trust survey of breeding shelduck. Next year will see increased activity with the BTO Winter Gull Roost Survey, and enhanced wildfowl counting in south-west London as a result of a Wildfowl and Wetlands Trust contract. The BTO would be conducting a census of corn buntings. For most of these projects the LNHS/BTO Task Force set up in 1979 would be used. This continuing work is seldom recognized and it is appropriate that the Society should publically express its thanks for the continuing efforts of all those involved.

We thank Imperial College for allowing us to use their rooms, and the staff at the College who care for the Society's library.

Finally, our thanks go not only to all our hard-working officers, but also for the tolerance shown by the families of those officers whose voluntary work for members keeps them from their homes so often.

Treasurer's notes on the annual accounts for 1991–1992

Presented at the Annual General Meeting on 14 December 1992. See also pages 130–131

In the financial year ended 30 June 1992 the Society's accounts show a surplus of £16,172 after making provision for the diminution in value of investments where the current market value is less than the book value. This compares with a surplus of £1,673 in 1990–1.

Total income was £45,286 compared with £29,798 in 1990–1. This increase is mostly attributable to generous bequests from the estates of Don Bowman and John Chipperfield (who also left books and other items to the Society), and profit on the sale of investments. Proceeds from the sale of investments (which are generally reinvested immediately) depend on the state of the market and the rate of turnover of our portfolio. They cannot be assumed to continue at any particular level, although even the current level of profits from this source is below the norm of recent years. Other investment income and interest, at £18,835 net, totalled 10 per cent more than in the previous year. Income from subscriptions and donations fell slightly to £10,188, but receipts from sales of publications showed 60 per cent growth, to £2,732.

There was a 2 per cent increase in overall expenditure, from £24,755 in 1990–1 to £25,288. Meetings costs, sectional and general expenditure (including depreciation of equipment costs) were held at the previous year's level. The net cost of producing the Society's main annual publications in 1991–2 rose by around 5 per cent; receipts from advertisements in the *London Bird Report* helped to contain its cost.

Society grants

The Society sets aside a small amount each year to assist conservation work, the establishment or maintenance of nature reserves and scientific investigation in the London Area. Applications for grants and loans are considered by the Administration and Finance Committee: enquiries should be addressed to its secretary. Papers reporting results of research supported in this way must be submitted for publication in the Society's journals.

Book review

Martin Lister's English spiders 1678. John Parker and Basil Harley, eds. Translated by Malcolm Davies and Basil Harley. Harley Books, Colchester. 1992. 208 pp., 1 colour, 12 monochrome plates. £49.95 hardback, ISBN 0 946589 27 5, £24.95 paperback, ISBN 0 946589 41 0.

It is unfortunate that British naturalists have had to wait until now for an English translation of Martin Lister's *Tractatus de Araneis* which was published in Latin in 1678, especially as it had been translated into German as long ago as 1778. This lack of an English edition has meant that Lister's work remained virtually unknown to the average amateur British naturalist. Even the more respected of our writers, with the exception of T. H. Savory, have dismissed Lister in a few lines.

Fortunately, John R. Parker's lifelong enthusiasm for the study of spiders, and in more recent years his interest in the times and achievements of Martin Lister (1638 – 1712), the 'Father of English Arachnology', has now given us this long-awaited work.

Mark Lister was a prolific writer whose first paper on spiders appeared in 1671. The *Tractatus de Araneis* is the first of three parts of his *Historiae Animalium Angliae Tres Tractatus,* and is the world's earliest known scientific work devoted entirely to spiders: it is cited by Linnaeus in the tenth edition of his own *Systema Naturae* of 1758. Lister was a contemporary of John Ray, whom he first met in France in 1667 whilst he was studying medicine, and there followed a long correspondence concerning mainly gossamer and aeronaut spiders. In 1671 Lister was elected a fellow of The Royal Society, and in 1685 he became a vice-president under Samuel Pepys. In 1684 he qualified as an MD, and after leaving Yorkshire he became a society doctor in London, numbering among his patients King Charles II and Queen Anne.

Lister can fully justify his retrospective title of Father of English Arachnology as his discoveries were based on his own observations on spiders caught by himself in either Yorkshire or Lincolnshire, unlike most of his predecessors who copied each other. The first part of the introduction, by John Parker, traces in detail Lister's family background, his life, and his contribution to arachnology and other disciplines. Dr Edwin Lankester, FRS, remarked that 'Lister's labours in natural history are of more value than those to medicine'. Similar remarks can well be made regarding many other 'founding fathers' of British natural history whose vocations appeared almost incidental, not only in the Arachnida, but in ornithology, entomology and botany. The second part of the introduction, by both editors, comprises valuable notes on the translation including classification, morphology, and terminology, as well as authorities consulted by Lister, and the environment in which he lived. Then follows the 110-page translation by Malcolm Davies and Basil Harley, with useful, frequent species notes by John Parker, and this is followed by nearly forty pages of correspondence between Lister and some of his contemporaries, like John Ray. The original monochrome plate of spiders and harvestmen is supplemented by a superb colour plate by Michael J. Roberts, which adds considerably to the value of the work. Lister's text is written in an easy and relaxing style and his observations contribute much to the vast store of our natural history knowledge, observations which are enjoyable to read and can now be quoted by present-day workers and duly accredited to Lister. As Professor John Cloudsley-Thompson, sometime chairman of the LNHS's Entomology Section, says in his foreward, this translation 'justifies Lister's right to be regarded as the founder of modern arachnology. It would have pleased him greatly'. It will certainly please modern-day arachnologists, as well as students of the wider realm of British natural history, all of whom should add this title to their bookshelves. We warmly thank John Parker and Basil Harley for giving us this pleasure.

K. H. Hyatt

Conserving nature in London

DAVID BEVAN
3 Queen's Road, London N11 2QJ

Presidential Address delivered at the Annual General Meeting on 14 December 1992

The present high level of interest in urban nature conservation is of comparatively recent origin, but this Society's involvement can be traced back at least 50 years, to the early years of the Second World War. In 1942 the then Ministry of Town and Country Planning had approached the Society with a request for a list of potential nature reserves in the London Area (Anon. 1943). These were to be considered for incorporation into a Greater London Plan which was to address the post-war development of London. Thus was formed the Society's Nature Reserves Sub-Committee which was later to evolve into our long-standing Nature Conservation Committee. They duly prepared a list of proposed sites (and these are included, complete with a map, as an Appendix to a paper by C. P. Castell (1946) in *The London Naturalist* entitled 'Nature conservation in the London Area'. The *Greater London Plan 1944* (Abercrombie 1945) was something of a disappointment in so far as it gave no consideration to the general problems of nature conservation. It did, however, devote a short paragraph to nature reserves, quoted in Castell (1946):

> 'There are few nature reserves in the London region; they might well be increased in number. The difficulty in a populous region is to fence them off or to enclose them inconspicuously. Human intrusion may be quite unwitting, but there is also the natural curiosity to penetrate into what appears to be set apart. On the other hand people should be encouraged to rejoice that some few places are left free for wild life: the plantations within Richmond Park are examples of the attraction of forbidden ground: they should not tempt to invasion.'

As can be seen, the emphasis at that time was very much on fencing nature off and keeping people out! The 'few nature reserves' mentioned were drawn from those originally identified by the Society and were largely confined to the newly designated Green Belt. Many were later to be notified as Sites of Special Scientific Interest under the provisions of the 1949 National Parks and Access to the Countryside Act. By that time, the LNHS, 'recognising that nature conservation would become an increasingly important feature of the Society's activities' (Castell 1946), had set up its permanent Nature Conservation Committee. For many years this was to remain the only body in London specifically concerned with nature conservation. Its annual reports published in *The London Naturalist* from 1950 chart the progress made and the setbacks encountered over a period of more than 30 years. They make fascinating and instructive reading, but in this short address I can but pick out a few examples of the Committee's many and varied activities. In the 1950s, under the chairmanship of Cynthia Longfield, the Committee was continuing its work identifying sites (Longfield and Castell 1952). By this time representatives from the various vice-counties in our area were sending in their own reports. In 1952, for example, Eric Groves, then representing our Surrey area, compiled a 60-page report giving details of 33 recommended sites. This was presented to The Nature Conservancy and gave ample evidence for the need to schedule further areas. (It would be fair to say that the great majority of existing Sites of Special Scientific Interest in London were originally identified by members of our Committee. A useful list of those notified in Greater London up to 1983 was included by Keith Betton (1984) in his Presidential Address. A few more have been added subsequently).

In addition to identifying important conservation sites the Committee acted in an advisory capacity. In 1952, for example, Stanley Cramp, then the Middlesex representative, was instrumental in encouraging the LCC Parks

Department to set up a bird sanctuary in Holland Park — the last remnant of semi-natural woodland in central London.

From 1954 to 1960 the *L.N.* (Nos 33–39) carried a series of reports entitled 'Nature Conservation in the London Area'. They were written by officers of the Nature Conservancy and describe the various threats to SSSIs within our area at that time. They also record the agonizingly slow progress towards statutory Local Nature Reserve status of the site now known as the Ruislip Lido. The LNHS and the Ruislip Natural History Society had together identified this Site and had persuaded the local council to manage it as a nature reserve in 1952, but it had to wait until 6 May 1959 for official declaration as southern England's first statutory Local Nature Reserve (Macfadyen and Gay 1959).

In the late 1950s the County Naturalists' Trusts for Berks., Bucks., Essex, Kent and Surrey were inaugurated. They were soon to be followed in 1963, by the Herts. and Middlesex Trust. This was a significant development and somewhat eased the burden of our hard-pressed Committee. C. P. Castell, the Committee's long-standing secretary, reported that 1961 had been a quiet year: 'This placidity may, perhaps, be due to an apparent reduction in the number and seriousness of threats to our conservation areas, but is more likely to be the result of increased activity of other societies and the County Naturalists' Trusts in our area, combined with the usual apathy of our members, at least towards this Society's conservation needs' (Castell 1962). Nature conservation was apparently proving something of an uphill struggle at that time! In his final report as secretary, Castell (1963) expressed the hope that the Society would 'take a prominent part in the future in collaborating with the Trusts in conservation matters'. In the years that followed this partnership was to become increasingly important, with representatives of the Trusts liaising closely with the Society.

In their report for 1969, the Committee described how Mr E. Milne-Redhead, acting on behalf of the LNHS, had organized the collection and sowing of over half a million bluebell seeds (Hersey 1970). Half were to be sown at the foot of Star and Garter Hill in Richmond, and the rest were sown in Highgate Wood. I have no information about the outcome in Richmond, but I believe that many of the bluebells still surviving in Highgate Wood derive from this valuable experiment.

To celebrate 'European Conservation Year' in 1970 the Society arranged a special programme of activities on a conservation theme (Small 1972). They were most ably organized by Pearl Small who was to chair the Conservation Committee throughout most of the following decade. At that time the Committee consisted of approximately 20 people. It should be remembered that, then as now, the Society employed no paid staff and its officers and members were all extremely busy people. Looking back today, it is remarkable how much was achieved with such slender means. In 1972, for example, the Committee played a prominent part in the successful campaign to save Staines Moor from the recurrent threat of gravel extraction (Small 1973).

Throughout the seventies the ravages of Dutch elm disease were all too apparent, and the Committee faced an uphill struggle in its attempts to persuade park superintendents to leave the dead elms alone wherever they did not constitute a hazard. Much unnecessary felling and 'tidying up' took place (McCord 1978).

The inauguration of the London Wildlife Trust in 1981 marked the end of one era and the beginning of another. The LNHS had been at the centre of conservation work in London for nearly 40 years. Now the London Wildlife Trust was the obvious body to carry on the work. John Montgomery was to play a central role in smoothing this potentially difficult transition. He was at that time not only chairman of our own Committee, but also chairman of the Surrey Trust. He was thus ideally placed to calm the inevitable anxieties of the county trusts around London, who were understandably fearful of a loss of membership and an erosion of territory (Smyth 1987). He became chairman of the new Trust's Conservation Committee and the LNHS gave a grant of £500 towards the salary of its newly appointed conservation officer.

At this time, there was a growing awareness within the wider conservation movement, of the increasing importance of urban conservation. Here, the emphasis had swung away from a concentration on the rare and spectacular towards an appreciation of the commonplace and familiar. There was a realization (fully debated during the lengthy passage through Parliament of the 1981 Wildlife and Countryside Act, and underlined in Marion Shoard's book *The theft of the countryside* (Shoard 1980), that rural habitats were fast disappearing and that rare species were all too often becoming extinct. The urban habitat itself, with its disused railway lines and canals, abandoned sewage works and derelict land of all kinds, had begun to receive attention in a new way. These habitats had been largely ignored or overlooked in the past, by traditional nature conservation. Richard Mabey's book *The unofficial countryside* (Mabey 1973), had given such places a new sort of respectability. By 1975 even the Nature Conservancy Council, who until then had paid scant regard to the urban environment, began to realize its rich potential. They had, in that year, commissioned a survey of the industrial West Midlands so as to be better able to advise on its wildlife and wildlife habitats. Thus was born Bunny Teagle's evocative study *The endless village* (Teagle 1978). He showed how wildlife was a vital part of our cities and had an important contribution to make towards urban renewal. In the final chapter, 'A way ahead', Teagle summed up his vision for the future: 'Over-riding all is the need to interest people in their wildlife heritage, to make it clear that the crowded towns are by no means devoid of natural history interest and to develop through both formal and informal education, a knowledge of the fauna and flora of the area and the desire for its continued existence'.

In London, the London Wildlife Trust was to set about doing just that. By 1987 the Trust had 16 permanent staff and a membership of 5,500, placing it in the top ten of the league table of RSNC trusts (Smyth 1987). At that time they were managing 25 sites in the Capital. Today they are involved in the management of no less than 58 reserves throughout London. (Roger Taylor pers. comm.). Their widely publicized campaigns, including 'Foxwatch' and 'Owl Prowl' have helped to raise the awareness of ordinary people about wildlife in London and they have been actively involved in the defence of a large number of threatened green sites throughout the Capital.

Shortly after their inauguration, there followed another event which was to have equally far-reaching consequences for nature conservation in London. This was the setting up, in 1982, of an 'Ecology Section' by the GLC to advise them on ecological matters. The Section was later to evolve into the London Ecology Unit (currently funded by the majority, but not all, of the London boroughs) following the abolition of the GLC in 1986. One of their first actions was to commission the London Wildlife Trust to carry out a strategic survey of all sites of possible significant conservation interest in the Greater London area. The habitats thus identified were chiefly assessed on the quality of their vegetation. The survey brought to light some valuable sites which had previously been missed, and uncovered a number of rare plants. One of the more important of these discoveries was that of the narrow-leaved water-dropwort *Oenanthe silàifolia,* a rare native umbellifer of doubtful previous occurrence in London, which was found growing in some quantity in damp meadowland near Yeading in the London Borough of Hillingdon (Hare 1988). Results from this extensive survey have been used as one basis for a series of handbooks on ecological topics, produced by the London Ecology Unit. Thirteen of these describe the detailed ecology of individual boroughs, and more are in preparation. The London Ecology Unit has grown into an impressive and innovative organization which offers advice to subscribing local authorities and provides expert witnesses for them at public inquiries.

Now many local authorities have become actively involved in conserving their green spaces: my own borough, Haringey, was something of a pioneer in this field, being the first in London to appoint a conservation officer in 1984 and the first to publish a detailed 'Nature Conservation Strategy' (Hope 1986).

One reflection of the local authorities' new found enthusiasm for nature conservation has been the recent dramatic rise in Local Nature Reserve (LNR) declarations in London. Such Reserves are selected by the local authority in consultation with English Nature, under Section 21 of the 1949 National Parks and Access to the Countryside Act. Today there are over 200 LNRs in England on sites which span a wide range of interests and uses (English Nature 1991). However, in London only three such Reserves (at Ruislip, Perivale and Scadbury Park) had been declared before 1987 and the first of these has already been mentioned. All were essentially rural in character. On 19 November 1987, a fourth site, The Gunnersbury Triangle, was declared by Hounslow Council. The circumstances that led up to this important declaration are vividly described in David Goode's book, *Wild in London* (Goode 1986). This was emphatically not a rural site. It was surrounded on all three sides by railway lines and had only been in existence for a mere forty years. As Dr Goode pointed out, 'It had none of the features which, in traditional nature conservation terms, would make it a place worth preserving'. Nevertheless, the woodland that had grown up on it provided the only genuinely wild place for miles around and it was greatly cherished by local people. British Rail, who owned the site, had applied for planning permission to put up warehousing over the whole of the Triangle. This was refused by Hounslow Council and a public inquiry followed in 1983. The inspector ruled that the development should not be allowed because of the considerable local ecological value of the site. This decision was hailed as an important precedent for urban nature conservation. Today (December 1992) there are 28 Local Nature Reserves in London and at least a dozen more have been formally welcomed (David Bentley pers. comm.). Many of these are also truly urban in character, none more so perhaps than that at Railway Fields, near Finsbury Park which, at 0.9 of a hectare, is currently the smallest LNR in London. Haringey also manages London's longest LNR, the Parkland Walk (Frontispiece), some 3.5 miles of land, once a railway line connecting Finsbury Park and Alexandra Palace.

Local authorities are now in the process of publishing their Unitary Development Plans (UDPs) and many of these include detailed proposals for protecting even their smallest patches of green space. Haringey, for example, has identified 54 such sites in its draft UDP (Haringey Council 1992). There is a wide variety of sites including ancient woodland, urban parks, abandoned allotments, canals, reservoirs, and small ponds. Never before have London's green spaces been subjected to such detailed scrutiny and this has led to some remarkable new discoveries. In his book *The historical flora of Middlesex* Kent (1975) included a list of 129 plants thought to have become extinct in the county. A surprising number of these have since been refound, and although some are best regarded as 'casuals' and unlikely to persist, others may well become a permanent part of the flora again. Mention has already been made of the narrow-leaved water dropwort discovered at Yeading in 1984. Equally remarkable was the finding, in that same year (Burton 1985), of the wall bedstraw *Galium parisiense* by Brian Wurzell, growing on top of a wall in Tottenham. This inconspicuous annual had last been seen in Middlesex 'at Hackney, on a wall' almost 300 years before, in 1690, the only previous record from the county (Kent 1975). The plant is currently receiving protection as part of an ecologically sensitive conservation project. Wurzell was also responsible for another remarkable discovery, the mousetail *Myosurus minimus,* a rare annual very seldom seen in the London Area, and found growing this time in the unlikely surroundings of Hyde Park (Burton 1991). It was, perhaps not surprisingly, unable to survive here for very long. My own contribution to this list of newly found plants includes the lesser water plantain *Baldellia ranunculoides,* in a pond near East Finchley in 1988 after an apparent absence of a mere 40 years (Burton 1989). I was also pleased to refind a small colony of the attractive golden dock *Rumex maritimus* in 1982 growing in the rather less attractive base of a disused concrete sewage container at Bounds Green (Burton 1983*a*). The colony survived here until 1988 and may well return; it has recently been reported from a few other Middlesex localities and may be increasing. Seed collected from the original colony germinated in 1992 and I have established a few plants at Railway Fields. The narrow-leaved hare's ear *Bupleurium tenuissimum* is less likely to return to Tottenham Marsh, from where I found a single plant in 1990 (Burton 1991). It was previously seen in abundance on Ealing Common around 1860.

New discoveries in urban habitats are not confined to the plant kingdom. In August 1990, for example, a small colony of the long-tailed blue butterfly *Lampides boeticus* was found on railway land at Gillespie Park Nature Reserve in Islington (Bevan 1991). What is more, the females were found to be ovipositing onto the flowers of the abundant bladder senna *Colutea arborescens,* and a number of the resulting larvae were successfully bred in captivity. There have been a few previous records of the long-tailed blue in the London Area (Plant 1987), but none of successful breeding. Sadly the colony failed to survive the following winter.

One other recent discovery needs to be mentioned here because it has implications for conservation in London. The Sumatran fleabane *Conyza sumatrensis* was first recorded in London (by Brian Wurzell) in 1984 and has subsequently spread at an alarming rate, partly, it seems, as a result of our recent run of hot summers (Wurzell 1988). It is already present in many gardens in north London and is likely to become an increasingly problematic weed. It poses a significant threat also to wildlife conservation areas and other reserves where its invasive nature and competitive ability could suppress the native flora in the more open habitats that it favours. It has now arrived, for example, in all three coppices which have been cut in Queen's and Coldfall Woods in Haringey and it may be difficult to eradicate. The Society could play a valuable part here in monitoring its future movements.

In his Presidential Address for 1982, Rodney Burton identified the central function of a local natural history society as 'the collecting of worthwhile and usable records' (Burton 1983*b*). This function has never been more important than today. For despite all the attention being paid to London's green spaces and all the exciting new discoveries being made, they remain essentially under recorded. Informed decisions about their management and conservation can only be made if there is the fullest information available on their natural history. This information is also of vital importance whenever such sites are threatened by development.

The LNHS can make an important contribution towards this knowledge through its recording activities. As part of a new strategy for greater use of information technology the Society has recently purchased a powerful new computer on which we are just commencing the construction of a valuable biological data base. Information stored in such a system, which could be quickly retrieved, would be of enormous value when vulnerable conservation sites come under threat. The subject of computer technology is one where I tread most carefully, for I am aware that my knowledge is limited. Nevertheless I do see the possibilities and I hope that other members, better qualified than I, will pursue these.

The Society has just appointed me to the newly created post of conservation officer. I see the job, initially, as primarily one of communication —

encouraging links between ourselves and other organizations concerned with conservation in London, such as the wildlife trusts, the London Ecology Unit, and English Nature.

I believe that this Society continues to have a role of vital importance to the common cause of conserving nature in London.

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Pond restoration and common frog populations at Fryent Country Park, Middlesex, 1983–1993

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Abstract

Populations of the common frog *Rana temporaria* were monitored by making spawn estimations during a pond-restoration programme from 1983 to 1993 at Fryent Country Park, Middlesex. The 100-hectare park is a remnant of traditional countryside, now surrounded by the suburbia of London. By the early 1980s many of the farm ponds had fallen into disuse and dried up, but have since been restored and new ponds have been created. The frog population increased as the number of water-holding ponds increased. During the latter part of the investigation a drought, which affected much of south-east England from late 1988 to early 1992, reduced the availability of water in the ponds and appeared to be responsible for a decline in the common frog population.

Introduction

There is evidence that populations of the common frog *Rana temporaria* have declined in lowland English countryside during recent decades, due to development pressures and intensive agricultural practices. Simms (1969) recorded the decline and loss of a common frog population from a pond in north Yorkshire following changes in agricultural land use in the years 1954–67. The decline of rural habitats and the loss of farm ponds has been documented, for example by Day et al. (1982) and Rackham (1986). Brown (1992) used data from Swan and Oldham (1989) to suggest that between 1945 and 1988 Britain lost 182,000 (38 per cent) of its 473,000 ponds. However, changes in the number of common frogs are debatable (Cooke and Arnold 1982, Beebee 1983, Frazer 1983, Langton 1991) without quantitative evidence.

This investigation was an attempt to describe how common frog populations responded to an increase in breeding habitat. It was undertaken at Fryent Country Park, a 100-hectare enclave of traditional Middlesex countryside, now surrounded by suburbia and bisected by the A4140 road. The Park is owned and managed by Brent Council and situated about 15 km north-west of central London. Geologically most of the Country Park is covered by London Clay and virtually all of the ponds were located on the clay. The Fishpond on the summit of Barn Hill had been excavated out of the underlying London Clay, even though the hill was capped by pebble gravel. The habitats of the Park were described by Williams and Northcroft (1992) and a description of the pond flora was given by Williams (1990). The other amphibians known to occur in the Park were the smooth newt *Triturus vulgaris* and a small population of the common toad *Bufo bufo*. Other notable wildlife included the meniscus midge *Dixella attica* (Williams and Fowler 1986). Langton (1985) reviewed the distribution of potential amphibian ponds in London, and Stuart (1992) studied the ponds in the London Borough of Brent. A review of the distribution and status of amphibians in London was presented by Langton (1991). Savage (1939) investigated the use of ponds by breeding frogs in countryside at Totteridge, about 9 km from Fryent Country Park.

The pond restoration programme commenced in the early 1980s, when it was apparent that many of the old farm ponds had dried up through neglect during recent decades. Ponds marked on nineteenth and early twentieth century maps had become so shallow that they survived as depressions in fields and only held water in wet winters. The aim of the pond restoration programme was to restore as many of the former ponds as practicable and where possible, to create new ponds.

Methods

A. Restoration work

Manual redigging of the old farm ponds included removal of excessive plant growth, deepening and enlargement. Work commenced in 1981 and accelerated from 1983, together with the creation of several new ponds. Mechanical excavation was also employed. Pond liners were not used as all of the farm ponds were on London Clay which holds water well in winter, and throughout the year if ponds were deep enough. The only exception was at the orchard pond were a reclaimed moulded plastic liner was used until it was stolen; it was then replaced by a larger, flexible butyl-rubber liner. Several of the ponds intercepted water from hedgerow ditches and field drains. All of the non-liner ponds were dependent upon saturation of the surrounding clay in winter for replenishment and thus it would often be well into the winter before ponds would refill.

B. Spawn survey

Survey methods followed those given by the British Herpetological Society (undated) and were based on the assumption that the number of clumps of frog-spawn indicated the number of female frogs visiting ponds to spawn and hence the size of the frog population. The recorder would visit each of the ponds from mid-February to late March until spawning had been completed. A walk would be taken around the pond edge and the number of clumps of frog-spawn estimated, and which within any pond were usually laid in one mat. Counts were required within a few days of spawning as the individual clumps quickly became difficult to identify within the mat. The BHS (op. cit.) suggests that the estimate should be within 20 per cent of the actual number of clumps and of the number of female frogs spawning at the pond. Almost all the counts were made by one recorder (LRW), but as a check counts were invited from other recorders. Spawn counts for the first years of the investigation were estimated from field notes.

Results

The location of the ponds is shown in Figure 1, with the pond names shown by reference letters. A summary of the restoration history of the ponds is given below. Estimates for pond areas refer to the maximum winter areas early in 1993; but do not indicate depth, volume or the stability of the water level. This list excludes seasonably flooded areas of fields.

A Richards, area 443 m^2. An old farm pond which was enlarged and deepened several times between 1983 and 1992, using a combination of machine and manual digging.

B Honey Slough, 75 m^2. An old farm pond, manually redug in 1983. The rubbish recovered indicated that the pond had not been cleaned out for at least 50 years. Other than the Fishpond, this was the only pond which held water continuously from 1984–93. A rare meniscus midge was recorded there shortly after the pond was restored (Williams and Fowler 1986).

C Lower Hydes, 338 m^2. An old farm pond manually redug in 1984 and enlarged with machinery in 1992.

D Great Hydes, 625 m^2. A new pond excavated with machinery in 1985.

E Upper Hydes, 220 m^2. An old farm pond restored with machinery in 1985 and enlarged in 1992.

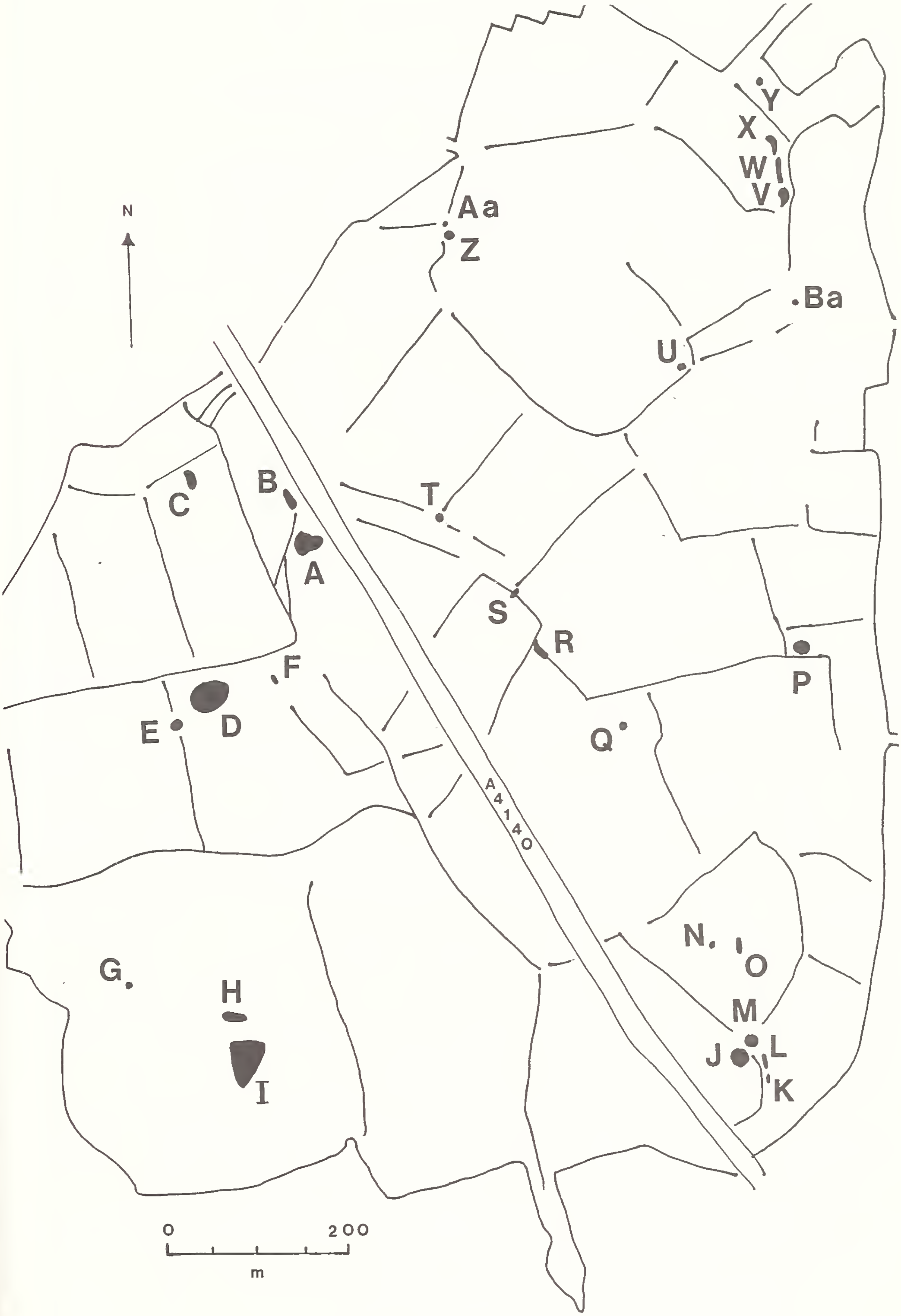

FIG. 1. Sketch map of 28 ponds at Fryent Country Park, Middlesex, detailed in the text. Note that pond size is diagrammatic only. The internal lines represent hedgerows. Field names and brief descriptions of the ponds are given in the text.

F HEDGE 3 POND, 4 m^2. A new winter pond, machine excavated at the end of a ditch about 1987.

G CLUMP, 15 m^2. A depression in the Barn Hill woodland enlarged by manual digging in 1988.

H GLADE, 90 m^2. The origin of this pond is unknown, but it was enlarged by manual digging in 1988. In winter it takes overflow water from the Fishpond, but this rapidly drains away without further replenishment.

I FISHPOND, 1,680 m^2. Excavated as part of the landscape plans of Humphry Repton in about 1793. This is the largest pond in the Park and has the highest elevation, just below the summit of Barn Hill. This is the only pond which held water continuously from 1983 to 1993. It was the only pond with long-term fish populations. Disturbance from fishing appeared to have declined since the mid-1980s and marginal vegetation established rapidly. Moorhens *Gallinula chloropus* were using the pond for breeding by 1992.

J LONG DOWN, 153 m^2. An old farm pond manually restored in 1983 and enlarged with machinery in 1992.

K GREAT COWLAYS SOUTH, 4 m^2. One of two new depressions adjacent to Great Cowlays pond, excavated manually in 1988.

L GREAT COWLAYS MID, 12 m^2. See **K.**

M GREAT COWLAYS, 60 m^2. An old farm pond heavily shaded by an adjacent oak and other hedgerow trees.

N LITTLE COWLAYS WEST, 8 m^2. A new pond dug manually in 1985 and 1992.

O LITTLE COWLAYS EAST, 8 m^2. A new pond excavated with machinery in 1986, but with limited water retention.

P LITTLE HILLCROACH, 150 m^2. A new pond dug manually in 1984. Vegetation established rapidly and by 1992 covered the whole pond. The pond was enlarged and deepened with machinery in 1992.

Q DORMERS MEADE, 66 m^2. An old farm pond as marked on early Ordnance Survey maps, but identifiable only as a depression in the field before manual and machine restoration commenced in 1985.

R WARRENS, 88 m^2. Located on the hedgerow ditch system, it was successively enlarged by manual digging from 1986 and by machinery in 1992.

S MEADE, 24 m^2. Located on the hedgerow ditch system and enlarged by machinery in 1992.

T PAGES, 20 m^2. Located on the hedgerow ditch system and enlarged by machinery in 1992.

U HOMEFIELD SUMMIT, 4 m^2. A depression in the ground enlarged manually in about 1989.

V OLDEFIELD SOUTH, 150 m^2. An old farm pond redug by machinery in 1985.

W OLDEFIELD MID, 260 m^2. A new pond excavated by machinery in 1987.

X OLDEFIELD NORTH, 125 m^2. A new pond excavated by machinery in 1987.

Y ROBERT SOUTHWELL, 42 m^2. A new pond dug manually in 1983.

Z GOTFORDS, 255 m^2. An old farm pond, deepened manually throughout the 1980s and extensively redug in 1992.

Aa GOTFORDS NORTH, 40 m^2. A hedgerow ditch fed by a field drain. Enlarged manually in 1986 and by machinery in 1992.

Ba ORCHARD POND, 6 m^2. This pond was created using a reclaimed moulded plastic pond, but when this was stolen the pond was enlarged manually and a butyl-rubber liner was used.

The estimates of the pond areas suggested that the total winter area of ponds increased from 2,248 m^2 in 1983, to 4,522 m^2 in 1989 and to 4,965 m^2 in 1993, which represented less than 0.5 per cent of the Country Park area. The Fishpond has an area of approximately 1,680 m^2 and therefore the estimated total area of the other ponds was 568 m^2 in 1983, 2,842 m^2 in 1989 and 3,285 m^2 in 1993. It is not practical to estimate which proportion of the excavation was undertaken by machine and which manually, though the manual contribution was considerable.

TABLE 1. Ponds holding water at spawning time in the late winter (w) and in the summer (s), Fryent Country Park, 1983–93. Many ponds which held water in both winter and summer would have held water throughout the year, but this should not be assumed in all cases. Results for the summer of 1993 were not available at the time of writing.

Pond reference letter and name	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
A Richards	w	ws	ws	ws	ws	ws	w	w	w	ws	w
B Honey Slough	w	ws	ws	ws	ws	ws	ws	ws	ws	ws	w
C Lower Hydes	w	w	ws	ws	ws	ws	ws	w	w	ws	w
D Great Hydes			s	ws	ws	ws	w	w	ws	ws	w
E Upper Hydes			w	ws	ws	ws	ws	w	w	ws	w
F Hedge 3 pond							w	w	w	w	w
G Clump								w	w		w
H Glade	w	w	w	w	w	w	w	w	w		w
I Fishpond	ws	ws	ws	ws	ws	ws	ws	ws	ws	ws	w
J Long Down	w	ws	ws	ws	ws	ws	ws	w	w	ws	w
K Great Cowlays south								w	w		w
L Great Cowlays mid								w	w		w
M Great Cowlays north	w	w	w	w	w	w	w	w	w		w
N Little Cowlays west				w	ws	ws	w	w	w		w
O Little Cowlays east							w	w	w	w	w
P Little Hillcroach			ws	ws	ws	ws	w	w	w	w	w
Q Dormers Meade					ws	ws	w	w	w		w
R Warrens			w	w	ws	w	w	w	w	ws	w
S Meade	w	w	w	w	w	w	w	w	w		w
T Pages			w	w	w	w	w	w	w		w
U Homefield summit								w	w		w
V Oldefield south	w	w	w	ws	ws	ws	w	w	w		w
W Oldefield mid						s	w	w	w	ws	w
X Oldefield north						s	w	w	w	ws	w
Y Robert Southwell		s	ws	ws	ws	ws	w	w	w	ws	w
Z Gotfords	w	w	w	w	ws	ws	w	w	w	w	w
Aa Gotfords north					w	w	w	w	w	w	w
Ba Orchard									w	s	w
Number of winter ponds	10	10	15	17	19	19	23	27	28	16	28
Number of summer ponds	1	5	8	10	14	15	5	2	3	12	n/a
Total number of ponds	10	11	16	17	19	21	23	27	28	17	28

The number of ponds increased during the restoration programme (Table 1 and Figure 2) and for example, the number which held water at spawning time in late winter increased from 10 in 1983 to 28 by 1991. The number of ponds capable of holding water in summer also increased, but the number that actually did hold water in summer was susceptible to weather conditions, increasing from one in 1983 to 15 in 1988, before falling to two in 1990 and increasing to 12 in the late summer of 1992. The effects of the summer droughts between late 1988 to mid-1992 were evident from Figure 2, and following the very dry winter of 1991–2, the number of ponds holding water at spawning time decreased from 28 in 1991 to 16 in 1992, before recovering to 28 in 1993. Meteorological records from the nearby Roe Green walled garden confirm the statement by Brown (1992) that rainfall in south-east England during the winter of 1991–2 was only 35 per cent of the 1941–70 average. Ponds which did not entirely dry out had greatly reduced volumes and surface-water areas. Fluctuations in the water level

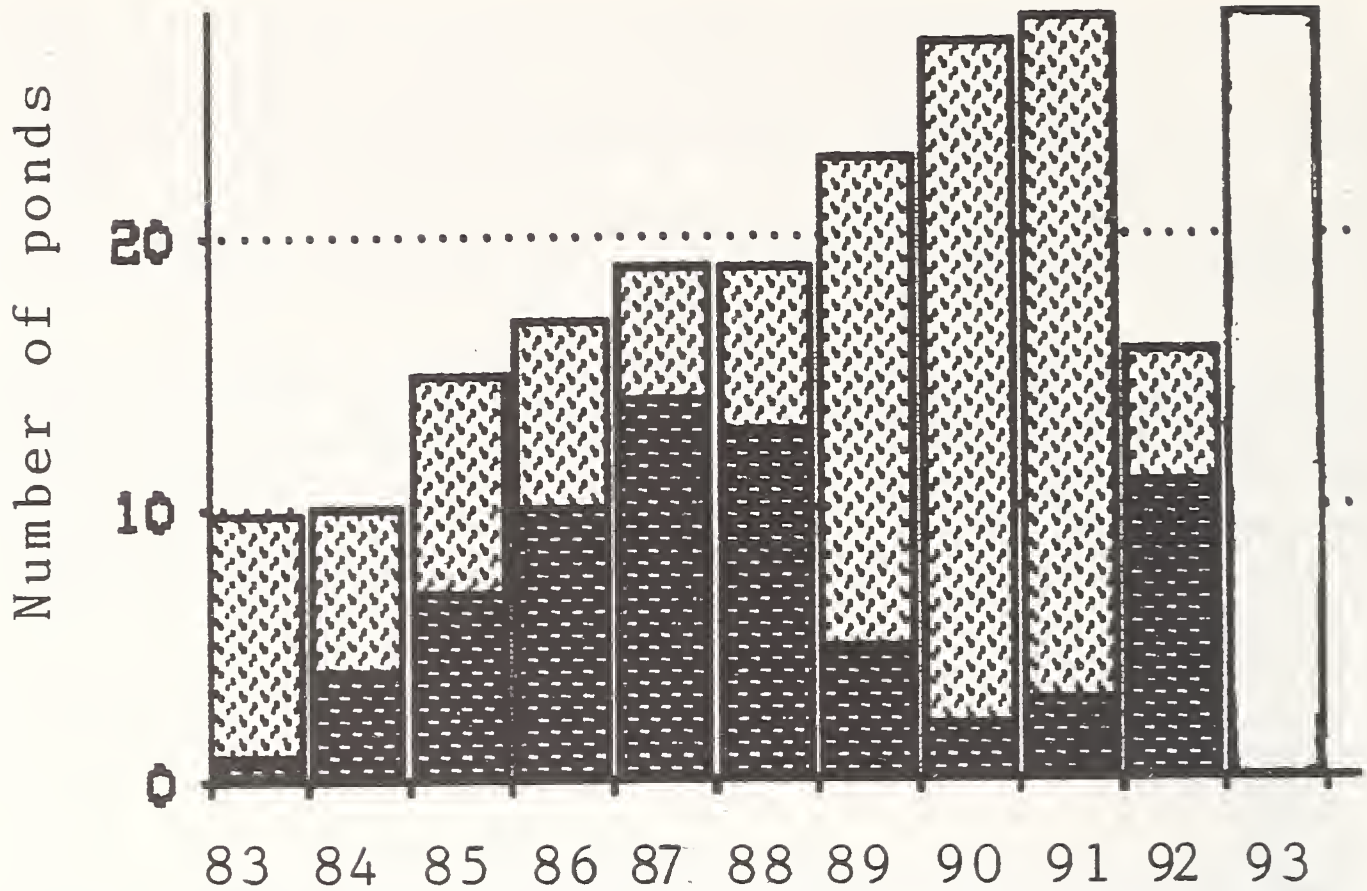

FIG. 2. The number of ponds holding water each year at spawning time (total height of bar) and the number of those ponds which held water in the summer of that year (dark shading), Fryent Country Park, 1983–93. Note that for 1993, the number of ponds holding water in summer was not known at the time of writing. Ponds which held water in the summer only are indicated in Table 1.

TABLE 2. Counts of the clumps of spawn of the common frog *Rana temporaria* laid in ponds at Fryent Country Park, Middlesex, 1983–93.

Pond reference letter and name	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
A Richards		5		5	5		45	23	30	7	
B Honey Slough			5	4	3			1			
C Lower Hydes			20	25	28	10	43	31		1	7
D Great Hydes				1	1	2	40	90	87	70	30
E Upper Hydes					8	20	78	120	40	130	38
F Hedge 3 pond											
G Clump											
H Glade							1				
I Fishpond	40	40	40	40	41	88	268	245	238	370	320
J Long Down			5		6	7	10	9			
K Great Cowlays south											
L Great Cowlays mid											
M Great Cowlays north				2	2		8				
N Little Cowlays west				1			1				
O Little Cowlays east							1	2	4	1	
P Little Hillcroach				5	10	10	36	38	60	30	7
Q Dormers Meade						3	11	9	12		
R Warrens					1		18	9	30	5	
S Meade											
T Pages											
U Homefield summit											
V Oldefield south						7	20	40	30		14
W Oldefield mid									35	50	29
X Oldefield north						1				30	32
Y Robert Southwell			4	5	6	20	40	45	20	14	25
Z Gotfords			10	10	10	15	35	90	53	57	8
Aa Gotfords north							3	6	1	14	7
Ba Orchard											5
Total	40	45	84	98	121	183	658	758	640	779	522

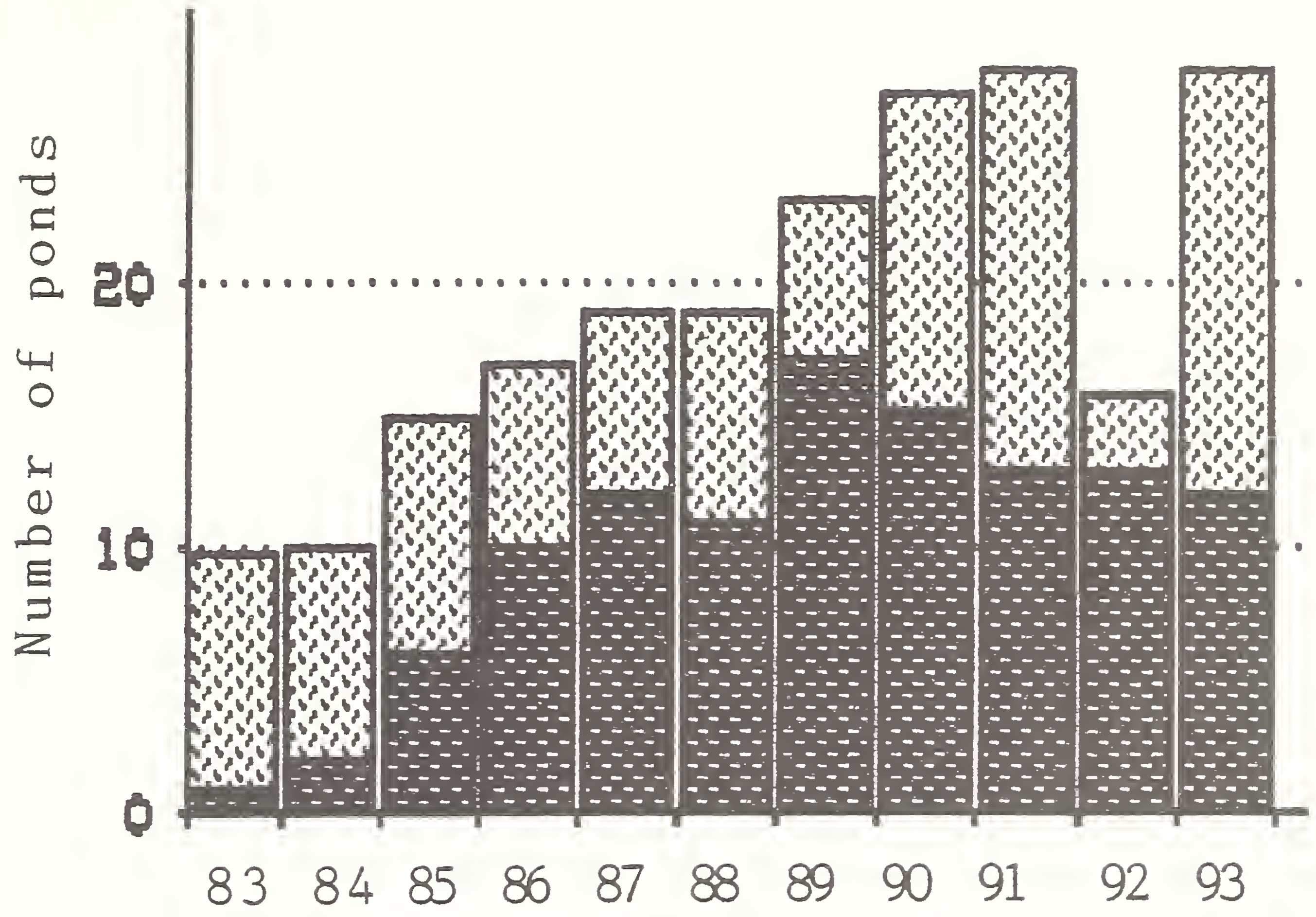

FIG. 3. The number of ponds holding water each year at spawning time (total height of bar) and the number of those ponds which were used by common frogs for spawning (dark shading), Fryent Country Park, 1983–93.

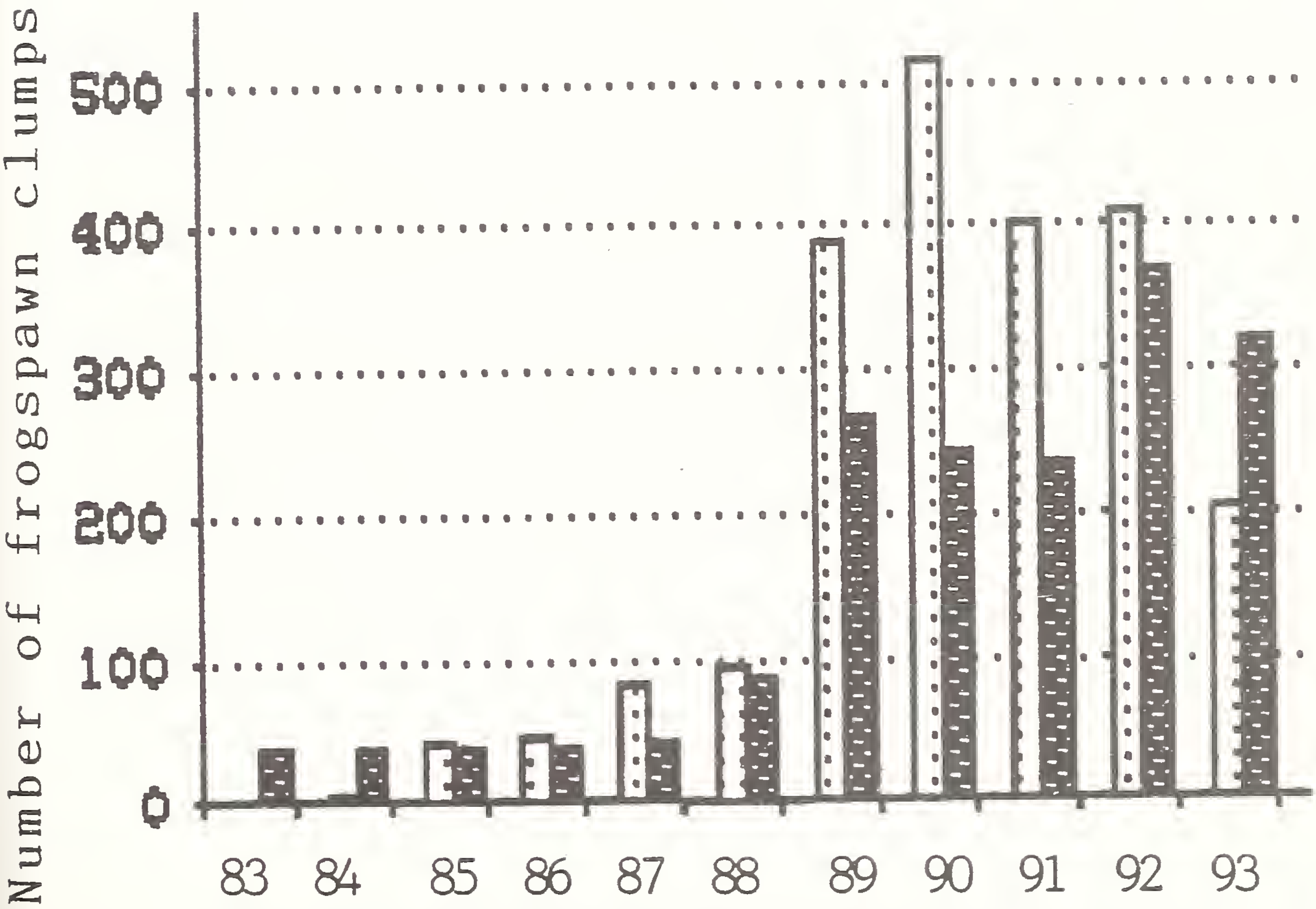

FIG. 4. Total counts of common frog-spawn in the Fishpond (dark shading) and in the 27 'farm' ponds (light shading), Fryent Country Park, 1983–93.

at spawning time of the Fishpond from year to year were not great, though wide margins would be exposed in dry summers. The end of the drought in late summer 1992 explained the apparent contradiction between the low number of ponds at spawning time and the recovery in the number of ponds which held water in that summer.

The number of ponds which were used for spawning increased as ponds were restored and reached a peak in 1989, before declining slightly (Table 2 and Figure 3). The use of ponds for spawning was obviously dependent upon the number which held water at spawning time.

The total quantity of frog-spawn increased during the period from an estimated 40 clumps in 1983 to 779 in 1992 (Table 2), but declined to 522 clumps in 1993. Separating the results for the Fishpond from those of all the other (farm) ponds, revealed an interesting distinction. Generally, frog-spawn increased during the 1980s in both cases and there was a marked increase in spawn between 1988 and 1989. While the Fishpond was not enlarged during this period, there was a considerable increase in vegetation. However, whilst the quantity of frog-spawn in the Fishpond appeared to increase during the drought, the frog-spawn on the farm ponds declined by 60 per cent from a maximum of 513 clumps in 1990 to 202 in 1993 (Figure 4).

Discussion

Two factors which affect the size of the common frog population were suggested by the results of this investigation. The increase in breeding habitat as a result of the pond-restoration programme appeared to be responsible for a rapid increase in the frog population during the earlier years of the investigation. A drought in the later years however, appeared to be the factor responsible for a decline in the population of common frogs on the farm ponds.

The restoration of the farm ponds, i.e. excluding the Fishpond, commenced in the early 1980s, and the number of ponds capable of holding water in the winter and throughout the year increased rapidly from 1983. The results suggested that the common frog population increased as the number of restored ponds and new ponds increased. After frogs colonized suitable ponds it was usual for the quantity of spawn to continue to increase for several years. Both the colonization of new ponds and the increase in spawn at each appeared to correspond to the logistic curves of other animal populations when presented with more favourable habitat or environmental conditions (see Dempster (1975) for an introduction to this subject).

However, by late 1988 to mid-1992, the increase in pond habitat was being countered by a drought. This was evident from the high proportion of ponds which dried up in the summers of 1989–91 (Figure 2). Even the number of ponds holding water in winter declined during the exceptionally dry winter of 1991–2. Frogs are seldom present in ponds all year and although the presence of water in ponds during summer was an indication of the water-retaining ability of a pond, there was little direct relationship between the presence of water in summer and the use of a pond for spawning. Frogs did of course require water at spawning time, but a drought in spring and early summer could result in the loss of all the tadpoles. This occurred frequently from 1989 to 1992 and in some cases the water level dropped before the spawn had even hatched. Drought conditions away from the ponds may also have affected the frogs, for example by a reduction in wet undergrowth and of invertebrate food. Although migration of adult common frogs to the Fishpond cannot be ruled out, it is suggested that the result of the drought was a decline in the frog population of the farm ponds and surrounding countryside. The remaining population may contain a high proportion of old breeding adults, with few young frogs.

The Fishpond was atypical of the farm ponds and is discussed separately. The common frog population there also increased during the investigation, even though no pond restoration work was undertaken, but there was a considerable increase in marginal vegetation. Photographs taken in the early 1980s show a pond devoid of marginal vegetation, although *Elodea* spp. were present in quantity, but by the late 1980s the marginal vegetation was sufficient to make fishing almost impractical and to enable moorhens to breed. The common frog population appeared to have benefited from the increase in effective habitat. The Fishpond retained water throughout the drought years and at this pond the drought did not affect spawning.

As an amphibian study site, Fryent Country Park was a paradox. Like other areas of traditional countryside, it was known that the number of ponds in the Park area had declined during the twentieth century up to the early 1980s and it appeared that the common frog population had also declined. Yet in the surrounding suburban areas there was some evidence that the common frog may have increased its distribution in the London Area since the 1970s (Langton 1991). Domestic gardens appear to mimic the favoured natural land habitats of amphibians; and with an estimated 106,000 garden ponds in London, the population of common frogs may be several times the density of that for rural, but intensely farmed areas. Langton (1991) noted that the highest densities of amphibians appeared to occur where there was a deep litter layer and other factors such as dead wood or rock piles with dense ground cover that provide shelter, a high degree of humidity and a productive food source. Although not easily quantifiable, the quality of non-aquatic habitat at Fryent Country Park had also probably improved during the past 10 years with an increase in the area of hedgerows, scrub and young woodland.

These results suggest that common frog populations will respond to the restoration of their habitats in lowland countryside. However, this conclusion must be qualified by a lack of knowledge of the other factors which affect frog populations. These include environmental and climatic conditions, the accessibility of nearby frog populations, introductions from and depletions to garden ponds, disturbance, the suitability of the surrounding habitat, the depth, area and volume of the ponds, quality of the water, vegetation in the ponds, and the lag period between restoration and colonization. Despite the simple method used to monitor frog populations, and imperfections in quantifying the water-holding ability of a pond, there appears to be considerable opportunity for further investigation of common frog populations.

Acknowledgements

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Book review

An illustrated guide to herbs, their medicine and magic. Anna Kruger. Dragon's World, Limpsfield, Surrey. 1992. 192 pp. £18.95. ISBN 1 85028 150 5.

The subtitle of this book gives an indication of the approach to herbal plants and medicine taken by the author, who is a specialist in holistic medicine. It is intended to rekindle in its readers some of the mysticism and magic, some of the old herbal wisdom, which are thought to have been lost to us with the advent of modern biochemical analyses.

The book begins with a brief trot through the history of herbalism, with a short paragraph each on Gerard, Culpeper, the doctrine of signatures, etc. There is a timely reminder of the importance of preventing further loss of species when we have so far analysed the chemical properties of so few (only about one per cent of the plant kingdom). There is a brief guide to propagation, growing and harvesting, and an ingenious but unexplained table telling us which plants benefit and which suffer from being grown in association with different herbs.

There then follows the main part of the book, a full list of herbal plants (including, incidentally, several which we would call spices — cinnamon, cayenne, etc.) arranged alphabetically by their English names, each species with a picture and a brief account of its appearance, habitat and uses. I certainly found out a lot of interesting information: I never knew, for instance, that the extremely poisonous *Atropa belladonna* got its generic name from Atropos, the third Fate who cut the thread of life (though the author does not mention that the specific epithet came from its use in Italy to enlarge the pupils and make the eyes look more attractive), nor that meadowsweet, once called *Spiraea ulmaria,* gave its name to aspirin, nor that borage was an effective cure for a hangover. Some of the comments are quite comic; for example we are told that selfheal's wound-healing properties were valuable after domestic disputes.

A high proportion of the plants described come from North America, with accounts of their use by native Americans. Many of them I had never even heard of, though some have intriguing names: balmony, bethroot, saw palmetto, and the toothache tree. Fortunately, perhaps, a large number of the plants which have now become naturalized and used in North America are of Old World origin. Other species described originated in the West Indies, South America, South Africa and the Far East.

This is a large, handsome, attractively produced book, a pleasure to hold and handle. The illustrations are delightful, each page has a border of miniature plants, and the price is surprisingly reasonable. However I confess I have some reservations about its value. The information about propagation and cultivation, etc., is too brief to be of much practical use, and if the herbs are in fact effective and safe to use, then there are few details about how one can actually prepare the herbal remedies suggested. It is not clear whether it is intended as a historical account of previous centuries' use of herbs, or a recommendation for their use today; and for many British readers it will have too great an emphasis on American herbs.

Do not look to this book, therefore, for practical instruction in the art of producing infusions, decoctions and lotions, but for a comprehensive and attractively presented account of the history and uses of many of the world's herbs and spices.

MARY CLARE SHEAHAN

Changes in the lichen flora on birch *Betula pendula* in northern Epping Forest

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Abstract

The lichen flora of Epping Forest has long been affected by air pollution from London. However, over the last 20 years Epping Forest has experienced a reduction in airborne sulphur dioxide, so that by 1985 mean winter levels were between 30 and 40 μgm^{-3}. The epiphytic flora at the base of 170 mature silver birch trees in northern Epping Forest has been monitored over the five-year period 1987–91. The crustose lichen *Lecanora conizaeoides* became less abundant, and *Cladonia coniocraea* and *Hypogymnia physodes* showed some expansion. However, recolonization was very weak when compared to that recorded in other woodlands around London. Results suggest that it is now acid rain, rather than sulphur dioxide, which limits recolonization of lichens on silver birch trees in Epping Forest.

Introduction

The lichen flora of Epping Forest is known to have been severely affected by air pollution from London. It is the most intensively studied rural site in which drastic changes in the lichen flora have been observed over the past 200 years (Hawksworth et al. 1973). Edward Forster made notes and collections of lichens in Epping Forest between 1784 and 1796 (Smith 1918, Laundon 1967), and Crombie (1885) carried out two separate studies in 1865–8 and 1881–2. Paulson and Thompson (1911 1913, 1920) studied the area between 1909 and 1919, and Rose and Pentecost carried out a further survey in 1969–70 (Hawksworth et al. 1973). Forster recorded a flora including tree lungwort *Lobaria pulmonaria* from Epping Forest in the late eighteenth century giving Zone 9 or 10 on the pollution zone scale of Hawksworth and Rose (1970), indicating mean winter sulphur dioxide below 30 μgm^{-3}. By the 1860s the lichen flora recorded by Crombie belonged to Zone 7 (about 40 μgm^{-3}) on the Hawksworth and Rose zone scale, and by the 1880s many of the most pollution-sensitive lichens had been lost so that the majority of the Forest belonged to Zone 5 (about 60 μgm^{-3}). By the early part of this century the flora recorded by Paulson and Thompson indicated Zone 4 (about 70 μgm^{-3}) and by 1970, Rose and Pentecost discovered that the few remaining lichens in Epping Forest fell within Zone 3, indicating mean winter sulphur dioxide up to 125 μgm^{-3}.

The increase in sulphur dioxide emissions from London responsible for the destruction of the lichen flora in Epping Forest throughout this period has been well documented (Laundon 1967, 1970, Sandford 1979). However since the mid-1970s sulphur dioxide levels in London have fallen markedly so that by 1983 mean winter levels were below 50 μgm^{-3} (Laxen and Schwar 1985). As a result, rapid recolonization by corticolous lichens has been recorded in north and west London (Hawksworth and Rose 1981) and in east London (Boreham 1992). Indeed the recolonization was so rapid in some areas that the concept of 'zone skipping' (Hawksworth and McManus 1989) was introduced. Epping Forest is to the north-east of London, and should also have experienced declining sulphur dioxide pollution and a consequent expansion of the lichen flora.

The woodland of the Epping Forest ridge largely consists of oak and hornbeam on the lower slopes of London Clay, with beech dominating the sand and gravel of higher ground. Silver birch is an ubiquitous tree in Epping Forest tolerating a variety of soil types and growing conditions. Although other tree species may support a wider range of lichens, many are over-mature pollards or coppices and are often widely spaced or confined to certain part of the Forest. In contrast silver birch is distributed widely and usually occurs as even-aged stands of standard trees providing a comparable substrate for lichen growth throughout the area. The bark of silver birch is often split and corky at the base, becoming smoother above, and even in unpolluted areas it is rather acid having very little buffering capacity. Indeed Coppins (1984) has described the corticolous flora as representing a 'worst case' scenario, being susceptible to both acid rain and aerial sulphur dioxide pollution. Sulphur dioxide has a toxic effect and causes acidification, while acid rain only lowers the pH (Gilbert 1986). Therefore recolonization of silver birch bark by lichens in Epping Forest would demonstrate that acid deposition had been significantly reduced. In this study the lichen flora of 170 silver birch trees in northern Epping Forest was monitored over a five-year period to establish whether or not lichen recolonization was occurring.

Lichens on silver birch

There is usually a strong correlation between the age and continuity of woodland, and the species diversity of the lichen flora. However, in Epping Forest silver birch largely forms secondary woodland less than 150 years old, with most trees under 100 years in age. Consequently there has been less time for lichen colonization on these trees, compared to other tree species in the Forest. The lichen flora of birch has been described in detail by Coppins (1984), and varies according to topographical situation, aspect, shelter, light, abrasion, temperature and humidity. The base of a tree is generally more humid and shaded, and less exposed than further up the trunk, and the bark is roughened, fissured and somewhat spongy at the base, becoming smoother and harder upwards. Although the water-holding capacity of bark, the nutrient status and leaching may affect suitability for lichen establishment, the most important factor in polluted areas appears to be the inability of the bark to buffer against acidification. In terms of species diversity silver birch is a poor host (phorophyte) to epiphitic lichens due to the low bark pH, which even in areas free from pollution is in the range pH 3.2–3.5 (Coppins 1984). As a result the lichen flora of silver birch has frequently been ignored by lichenologists. In unpolluted situations the sloping bases of silver birch trees typically support the *Cladonion coniocraeae* community, including *Cladonia* spp., where the spongy bark retains rather acidic water, and the *Leprarion* community (Laundon 1992), with *Lepraria incana* (treated as the aggregate species) in drier places. Further up the trunk, where more light is available, the *Pseudevernion furfuraceae* or *Physodion* community, with *Hypogymnnia physodes* and *Parmelia saxatilis,* becomes established. However, in areas exposed to mean winter sulphur dioxide pollution between 55 and 150 μgm^{-3} the *Lecanorion variae* or *Lecanoretum conizaeoidis* community (Laundon 1980), with *Lecanora conizaeoides* becomes dominant, except at the very base of trees and on the driest parts. In areas where mean winter sulphur dioxide is greater than 150 μgm^{-3}, birch trunks have very few epiphytes. Historical notes from Epping Forest in the early part of this century by Paulson and Thompson (1911, 1913, 1920) and Paulson (1918) show that silver birch trees generally had very few lichens upon them, except on their bases where *Hypogymnia physodes* and *Lecanora conizaeoides* were often seen associated together.

Methods

Study area

The study area, located in northern Epping Forest, is shown in Figure 1. Epping Forest lies on a NE–SW trending ridge between the Lea and Roding Valleys, and has a maximum elevation of 110 m O.D. The area is surrounded by mostly arable farmland, with the mainly residential towns of Loughton, Epping and Waltham Abbey within a 4-km radius.

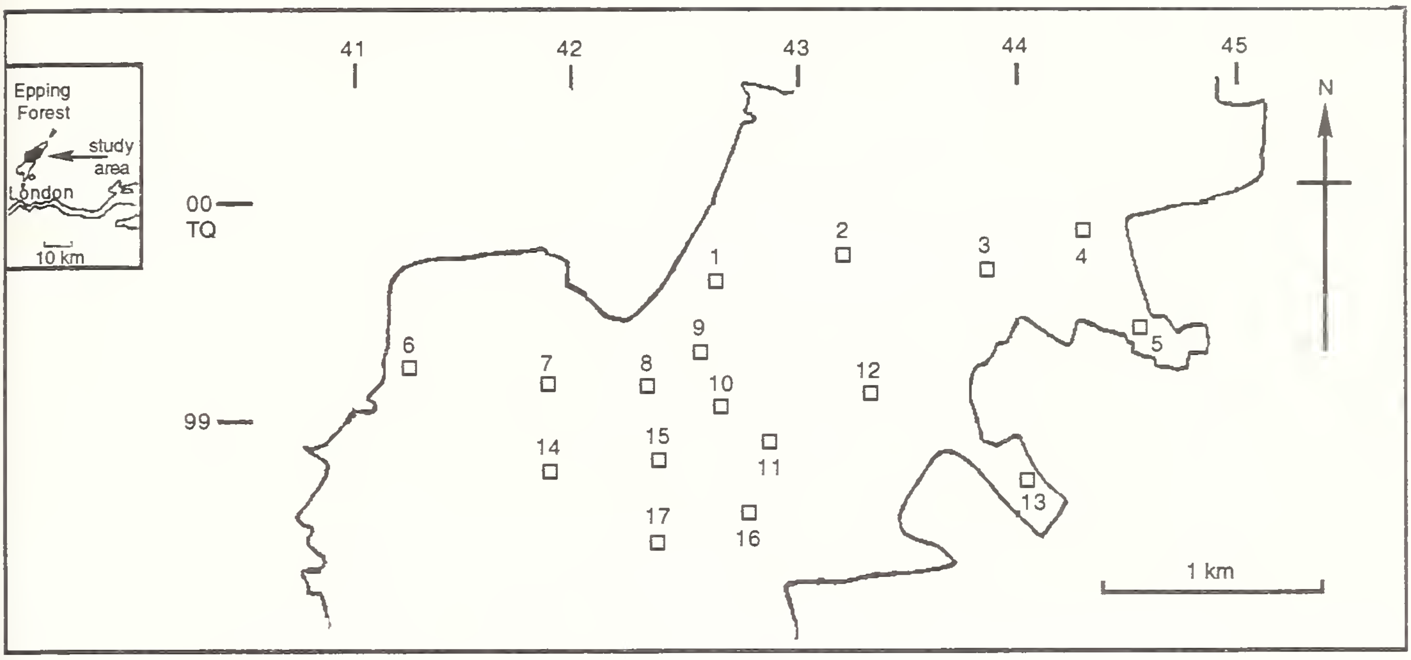

FIG. 1. Map of the study area showing the location of sites 1–17 and the boundary of Epping Forest. The site names are as follows: 1 north of the Wake Arms, 2 Long Running, 3 north of Oak Hill, 4 west of Piercing Hill, 5 Theydon Plain, 6 bottom of Claypit Hill, 7 Honey Lane Quarters, 8 Sunshine Plain, 9 south-west of the Wakes Arms, 10 Deershelter Plain (east), 11 Dulsmead Hollow, 12 The Ditches Ride, 13 Birch Wood, 14 west of Wake Valley Pond, 15 Deershelter Plain (west), 16 Goldings Hill, 17 Great Monk Wood.

Survey and analysis

In the period May to August each year between 1987 and 1991, ten upright silver birch trees within even-aged stands, with girths between 60 and 120 cm (at 1.3 m), at each of 17 sites were surveyed (Figure 1). A quadrat 30 × 30 cm was centred at a height of 15 cm on the west-facing side of each bole, and the percentage cover of corticolous lichens and of the algal *Desmococcus* community were recorded, using the nomenclature of Dobson (1981). The mean percentage cover of each taxon, each year, was calculated for the whole data set and for each site.

Results and discussion

Sulphur dioxide data

The mean monthly sulphur dioxide levels recorded between 1981 and 1985 at three monitoring stations surrounding the study area were kindly provided by Epping Forest District Council. Although records for some months were not available, the data serve to illustrate the general levels of sulphur dioxide prevailing prior to this study. These results have been summarized in Table 1. It appears that between 1981 and 1985 mean winter sulphur dioxide levels in the areas surrounding northern Epping Forest were declining. It seems reasonable to assume that by 1985 the study area was experiencing monthly mean sulphur dioxide levels of between 30 and 40 μgm^{-3}, and that this trend continued until 1987.

TABLE 1. Mean winter sulphur dioxide levels (μgm^{-3}) at three stations surrounding northern Epping Forest. Figures in brackets are calculated from four months' data (December–March) only; *indicates insufficient data; – indicates no data.

Station	Distance from study area	Mean winter SO_2 (μgm^{-3}) 1981–2	1982–3	1983–4	1984–5
Epping	4 km north	30.6	26.3	*	–
Chigwell	5 km south	48.8	43.0	(39.5)	29.8
Waltham Abbey	4 km west	*	40.8	(40.5)	–

Acid rain data

Analysis of daily measurements of the pH of precipitation at the Epping Forest Conservation Centre (now called The Epping Forest Centre), shows that the most acidic rain was generally brought by north-easterly winds. The mean annual pH of precipitation was 4.49 in 1984, and 4.37 in 1986, with some rainfall having a pH <3. It is therefore likely that any unbuffered substrate available for lichen colonization in the forest would also be subjected to this level of acidity.

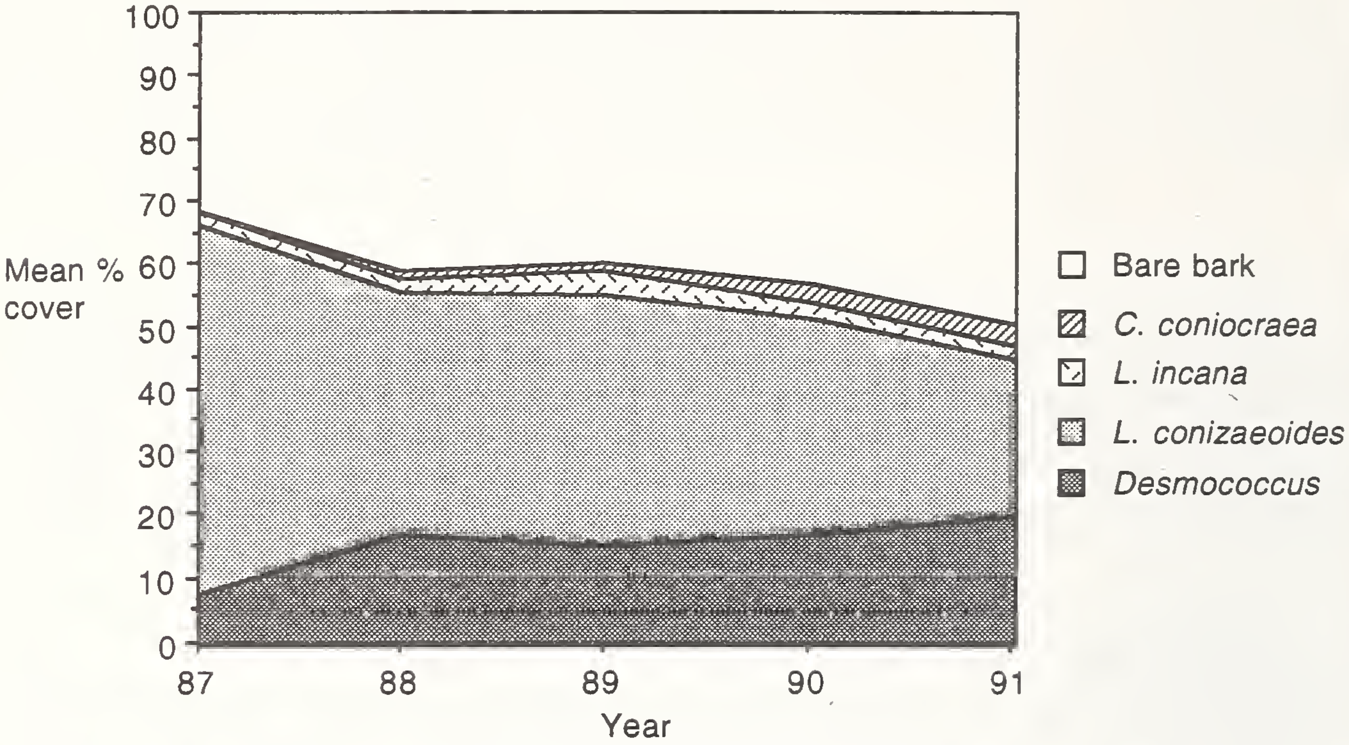

FIG. 2. Mean percentage cover of the algal *Desmococcus* community and of *Lecanora conizaeoides, Lepraria incana, Cladonia coniocraea* and bare bark, at the base of 170 mature silver birch trees in northern Epping Forest over the study period. The mean cover of other epiphytes including *Hypogymnia physodes* is too small to show on this figure.

The *Desmococcus* community and *Lecanora conizaeoides*

Figure 2 shows the changes in mean percentage cover of the *Desmococcus* community and *Lecanora conizaeoides* between 1987 and 1991. During this time the mean cover of the *Desmococcus* community rose from 7.9 to 20.6 per cent. However, distribution and abundance over the study area showed no clear pattern, with sporadic variations probably due to local changes in humidity and other factors. In contrast the mean cover of *Lecanora conizaeoides* fell from 58.3 per cent to 25.0 per cent over the study period. In 1987 *L. conizaeoides* was present with a mean cover of >40 per cent at all but one site, yet by 1991 this level of abundance was maintained at only four sites in the central parts of the Forest. Despite this decline *L. conizaeoides* remained widespread at lower frequencies, occurring with the *Desmococcus* community at all sites throughout the study period. The parasitic lichenicolous basidiomycete fungus *Athelia arachnoidea* became locally abundant, especially on beech trees, in autumn 1987, attacking swards of *L. conizaeoides.* However, it did not become well established on the rough basal bark of silver birch boles, reaching a maximum mean cover of 0.4 per cent in 1988 and declining thereafter.

Lepraria incana and *Cladonia coniocraea*

Figure 2 also shows the changes in mean percentage cover of *Lepraria incana* and *Cladonia coniocraea.* The mean cover of *L. incana* increased from 1.8 per cent in 1987 to a maximum of 2.8 per cent in 1989, and fell again in 1991. This small variation may not represent a significant change, although analysis of distribution and abundance suggest an expansion of *L. incana* from central parts of the Forest, followed by an apparent die-back event. The mean cover of

Cladonia coniocraea showed a gradual increase from 0.9 per cent in 1989 to 3.5 per cent in 1991. It expanded at sites in central areas of the Forest, and colonized several sites where it had previously been absent.

Hypogymnia physodes **and other lichens**

Although *Hypogymnia physodes* was rather infrequently encountered during this study, its distribution is worth noting. It appears that between 1987 and 1989 *H. physodes* was present on relatively few trees at a small number of sites. Maximum mean cover of *H. physodes* in 1989 barely exceeded 0.1 per cent (site 16 had a maximum cover of 1.5 per cent), but in 1990 it was at its most widespread on 14 trees at eight sites, with a similar distribution in 1991. Some records of thallus size were also taken, although these were not comprehensive. In 1987 most specimens of *H. physodes* were present at sites in central parts of the Forest, and tended to have relatively large thalli (>12 mm), but by 1990 many smaller thalli (<4 mm) had appeared at sites throughout the Forest. Both *Lecanora chlarotera* and *Lecanora expallens* were also encountered during this study, but these were rare; never exceeding more than a few per cent cover on a single tree.

Discussion and conclusions

Between 1987 and 1991 the lichen flora of silver birch trees in northern Epping Forest showed a number of changes. The most marked of these was the steady loss of *Lecanora conizaeoides;* a trend for which the parasitic fungus *Athelia arachnoidea* appears not to be directly responsible. In addition there is no evidence that the decline of *L. conizaeoides* was due to interspecific competition, and although the *Desmococcus* community expanded, the area of bare bark also increased. It is probable that the loss of *L. conizaeoides* was a result of environmental factors, possibly linked to falling sulphur dioxide levels. The variation in abundance of *Lepraria incana* was relatively small, but appeared to indicate an expansion followed by a die-back event. However *Cladonia coniocraea* and *Hypogymnia physodes* both showed expansion throughout the study period, which would suggest that some recolonization was slowly occurring.

It is notable that sites at the centre of the Forest acted as a refuge, and as an area from which expansion appeared to take place. Presumably these were subjected to less pollution, or offered better conditions for lichen growth than peripheral sites. This may be due to the higher altitude of sites on top of the ridge and the protection afforded by the surrounding woodland. When the Hawksworth and Rose Zone scale (1970) for estimating mean winter sulphur dioxide levels is applied to the data it gives central sites (sites 7, 15 and 16) as Zone 4 (about 70 μgm^{-3}) and peripheral sites (sites 5, 6 and 13) as Zone 3 (about 125 μgm^{-3}). This is clearly at odds with the data presented in Table 1, which shows mean winter sulphur dioxide to be in the range 30–40 μgm^{-3}. In addition, *Hypogymnia physodes* is a calcifuge species showing considerable tolerance to both acid rain and sulphur dioxide, and so would be expected to have recolonized except in extreme conditions. However, it is known that acidification of the substrate can kill propagules even though mature thalli may survive (Bailey 1976). Therefore it seems likely that the poor buffering capacity of silver birch bark, coupled with acidification from precipitation, has prevented vigorous lichen recolonization of silver birch bark in Epping Forest. It would appear that it is now acid rain, and not sulphur dioxide, which acts as the factor limiting lichen recolonization on silver birch and presumably other poorly buffered substrates.

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The natural history of Feltham Marshalling Yard

The late PETER W. CRIBB
Sadly the author died shortly before publication of this paper

Abstract

A statement in respect of the history of the now-abandoned railway marshalling yard at Feltham, Middlesex and reports of surveys undertaken since 1988 in respect of some of the flora and fauna of the site are given. The current position in regard to the development of the site is also considered.

Introduction

This site, which lies immediately south of the railway line on the London side of Feltham railway station is classed by the London Ecology Unit (Pape 1990) as being of Metropolitan Importance, primarily for its floral content. The area is approximately 90 acres (36 hectares) and the land was acquired at the beginning of the 1914–18 war by the London & South Western Railway Company for the formation of the first 'hump yard' to be established in Britain. It spans the River Crane and formed part of the flood-plain adjacent to Hounslow Heath, with the east and west extremities being heathland on Taplow Gravels. The development of the Yard required the infilling of the flood-plain and the building of three tunnels, two to allow the through passage of the River Crane and a parallel mill-stream, which fed the powder-mills to the south in Twickenham, and the third to provide a footpath and bridleway beneath the new Yard. The infill was of chalk which was then capped throughout the greater part of the Yard with clinker, providing three diverse habitats: one having a chalk substrate, one a clinker bed over gravel and the third being the original heathland. Ramps of chalk and clinker were superimposed to form the 'humps' used in the shunting of goods wagons. Some of this work was carried out by German prisoners of war and was completed after the 1914–18 war in 1920. The Yard remained operative from then until the 'Beeching Axe' in 1970 when it was abandoned.

The area had, until then, been fenced, but very quickly the fences were destroyed by the local children who used the area for recreation and for scramble riding of motor cycles. I lived some two hundred yards from the edge of the Yard and was able to observe how quickly vegetation took over the whole area (Figure 1), so that by 1980 it had become a blaze of wild flowers in summer (Figure 2) and a major source of nectar and pollen for my apiary nearby.

The surveys

In 1984 I was able to encourage one of the students working at The Royal Botanic Gardens, Kew to carry out, as part of her thesis, an investigation of the plants present. The findings were most exciting as there appeared to be a large number of calcicolous plant species, together with breckland and exotic ones, reflecting the diverse soil conditions. It was obvious that these plant invasions had not arisen locally, but must have come either with the initial landfill or, more likely, by seed dispersal via the wagons which had come to the site from all over Britain.

For several seasons more students from Kew carried out surveys as part of their ecological studies, and in 1988 a very full listing of the plants present was undertaken by Drs Tom Cope and Phillip Cribb and Charles Stirton who identified some 240 vascular plants. An exciting find was the black broom *Cytisus nigricans,* the first record of the plant growing wild in Britain, there being about a hundred bushes in a clump on the heathland area (Figure 3). Where common and pale toadflax *Linaria vulgaris* and *L. repens* grow closely together there are colonies of hybrids and the calcareous central area supports

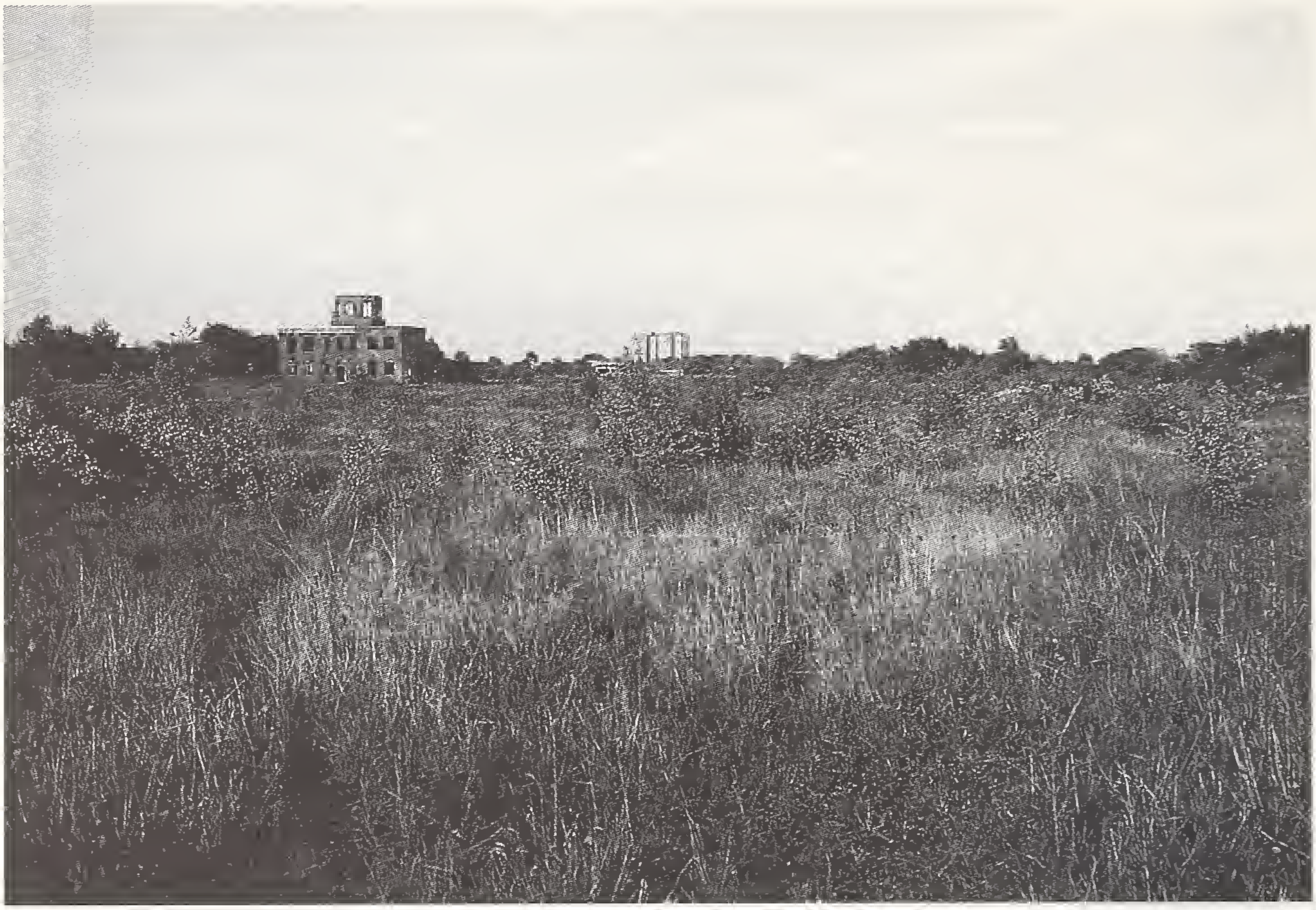

FIG. 1. Feltham Marshalling Yard in early spring 1989. The former control tower is to the left.

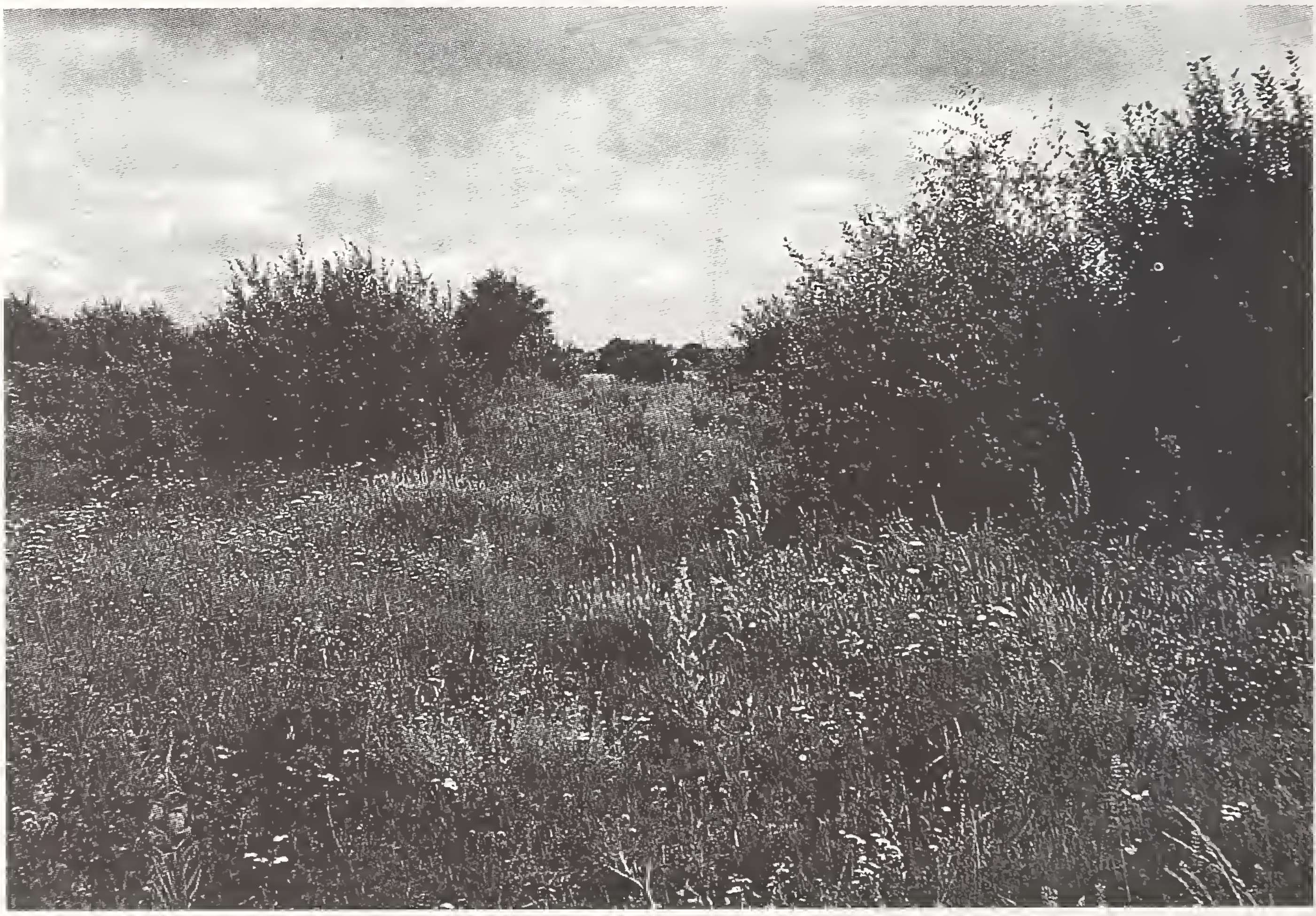

FIG. 2. Summer flowers cover the former Marshalling Yard, seen here in 1988, and are a major source of nectar and pollen.

such plants as sainfoin *Onobrychis viciifolia,* viper's bugloss *Echium vulgare,* burnet saxifrage *Pimpinella saxifraga,* salad burnet *Sanguisorba minor,* field scabious *Knautia arvensis* and greater knapweed *Centauria scabiosa.* There are 26 species of Leguminosae and amongst the 24 species of grasses are *Poa compressa, Bromus lepidus* and *Festuca ovina tenuifolia.* The dominant trees are birch and goat sallow, with small clumps of aspen and hawthorn. The poverty of the soil ensures that there is little competition from the normal ruderal plants, and motor cycle disturbance, drought and occasional summer fires have controlled rank growth. Several additional species have been recorded since the 1988 survey, including the harebell *Campanula rotundifolia.* The vascular plants recorded are given in Table 1.

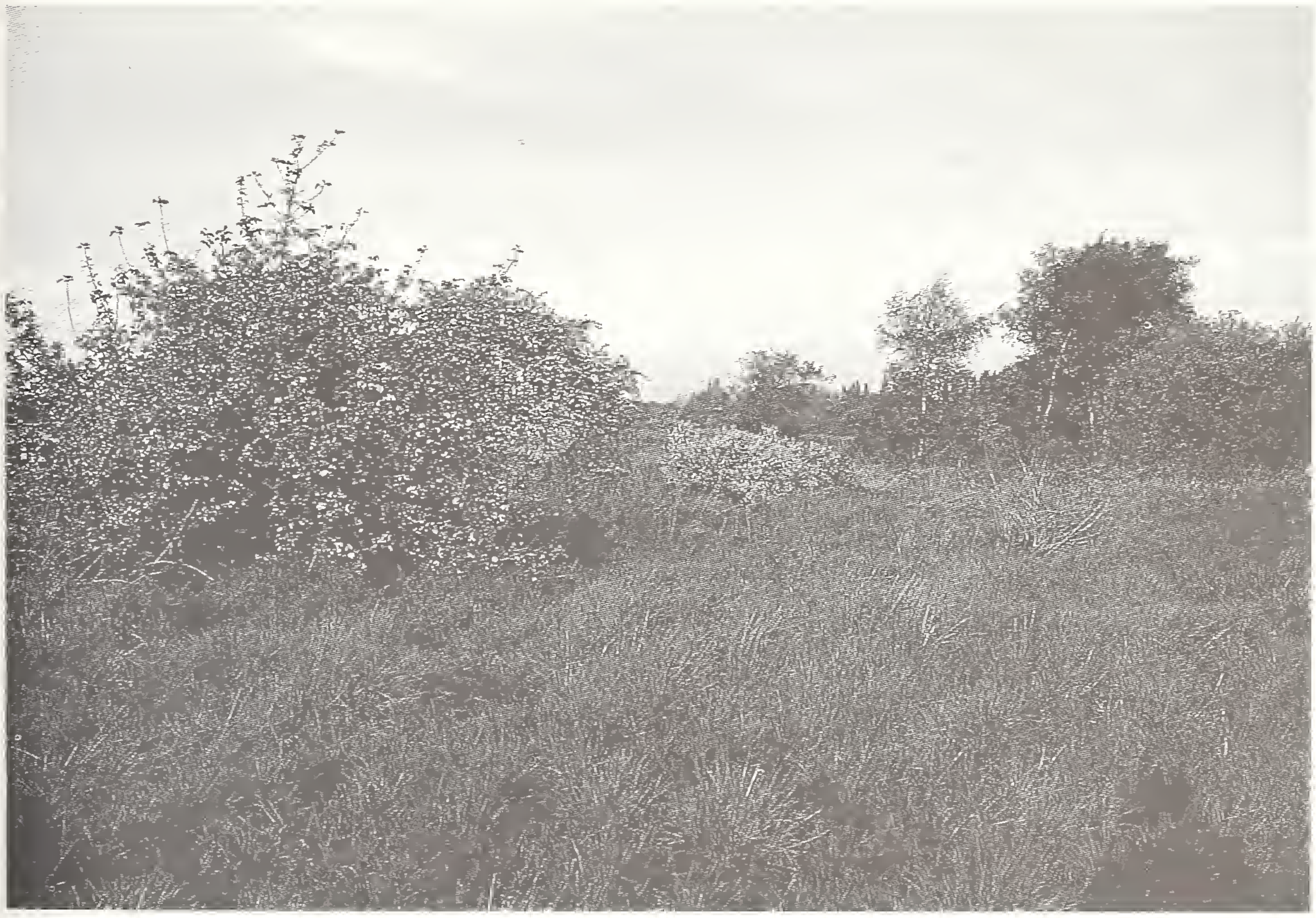

Fig. 3. Black broom *Cytisus nigricans,* seen here on the heathland area in 1990, was the first record of the plant growing wild in Britain.

In 1992 a preliminary survey of the lichens was carried out by Messrs Frank Dobson and Mark Seaward just prior to the erection of new steel fencing by British Rail in an attempt to prevent public access. Some 17 species were identified, including eight species of *Cladonia* (Table 2). The mosses and fungi which are widely present have not been listed yet.

Associated with the diverse vegetation is a strong insect population, and I have recorded 26 species of butterfly visiting or breeding there, including a specimen of the pale clouded yellow (a male *Colias ?alfacariensis)* in 1991. There are strong colonies of the common blue *Polyommatus icarus* and small copper *Lycaena phlaeus,* also the grass-feeding Essex, small and large skippers *Thymelicus lineola, T. sylvestris* and *Ochlodes venata.* The grayling butterfly *Hipparchia semele* was also breeding there until recent disturbance arising from initial industrial development. Light-trapping has produced six species of hawk moth and 50 species of Noctuidae, 20 of the Geometridae and many of the Microlepidoptera. Both the five-spot and six-spot burnet moths *Zygaena lonicerae* and *Z. filipendulae* breed there. The buddleia bushes which edge part of the site are a great attraction in the summer and swarm with insects including the hoverfly *Volucella zonaria,* a parasite of the wasp nests present. Seven species of bumblebee have been recorded there, and on the original heathland there are a hundred or more large nests of the yellow ant *Lasius flava.* In high summer the ground is alive with grasshoppers. Among the beetles found there is *Carabus granulatus,* a large predatory species. Table 3 lists the insects recorded.

The plants in seed attract large flocks of finches and other birds and the copses provide breeding sites for five species of warbler. There are several pheasants and a covey of partridges, and in winter a few woodcock. Birds from the adjacent Hounslow Heath use the Yard as an extension of their territory, the only barrier being the railway line between the two areas (Table 4).

The future of the Yard

At the time of the survey of the plants in 1988 Hounslow Council had already given planning permission for the industrial development of about 40 acres of the site at the eastern end, the permission being subject to an agreement in respect of the central area over the tunnels, this to be retained as part of the Crane Valley Open Space. A further application from British Rail sought to build some five hundred dwellings over the remaining western area, an area of about 40 acres. There was massive objection to the plan from the residents of Feltham and Hanworth, London Wildlife Trust, local natural history societies, Friends of the Earth, and other groups, and as a result of the evidence produced to the Council, the application was rejected. A public inquiry followed and although the inspector found in favour of British Rail on the grounds that housing was necessary for the Borough, the Minister rejected the appeal as the only access to the site was across public open space owned by the Council, land which included an unimproved meadow and other land of ecological importance. The Council was not prepared to sacrifice this for the gain offered by British Rail, being a larger central area to be handed to the Council as a nature reserve. The close proximity of the proposed housing and the agreed industrial development would have made such an area untenable as a nature reserve and would be a poor exchange for the loss of the area to be used for road construction. At the time of writing this (spring 1993), Hounslow Council has included the western area of the site in its Unitary Development Plan as Green Belt. At the ensuing public inquiry, still not resolved, British Rail is contending this designation.

Discussion

Botanically the site is probably one of the best and most diverse abandoned industrial areas in Greater London and worthy of reserve status and would provide an excellent instructional area for local schools and colleges. Its landlocked position would seem to preclude its development without constructing an access road across important adjacent public open space. British Rail could, of course, use the land again for railway purposes but, in view of its application to use the land for housing, it is unlikely that it will have any future need of it as railway land. Hounslow Council would like to have the western and central areas designated as a Local Nature Reserve and arrange for its management in association with the management already undertaken by the Council on the adjacent Hounslow Heath.

Reference

PAPE, D. 1990. *Nature conservation in Hounslow.* London Ecology Unit.

TABLE 1. Vascular plants recorded at Feltham Marshalling Yard.

Data source: a) Draft report of a survey of habitats and notable plant species, London Borough of Hounslow Leisure Services Department, October 1988; b) London Wildlife Trust data supplied 12 June 1989.

PTERIDOPHYTA
Dryopteris filix-mas
Pteridium aquilinum
Equistum arvense

BETULACEAE
Betula pendula

BORAGINACEAE
Echium vulgare
Symphytum tuberosum
Pentaglottis sempervirens

BUDDLEIACEAE
Buddleia davidii

CAMPANULACEAE
Campanula rotundifolia

CAPRIFOLIACEAE
Sambucus nigra

CARYOPHYLLACEAE
Arenaria serpyllifolia
Silene alba
Silene vulgaris
Silene nutans
Silene dioica
Cerastium arvense
Cerastium glomeratum
Cerastium semidecandrum
Cerastium fontanum

CHENOPODIACEAE
Chenopodium album
Chenopodium vulvaria
Chenopodium murale
Chenopodium rubrum
Atriplex patula

COMPOSITAE
Achillea millefolium
Arctium lappa
Arctium pubens
Anthemis arvensis
Anthemis cotula
Atemisia vulgaris
Carduus nutans
Centaurea debeauxii (= nemoralis)
Centaurea nigra
Centaurea scabiosa
Chamomilla (Matricaria) recutita
Chamomilla matricarioides (=suaveolens)
Cichorium intybus
Chrysanthemum leucanthemum
Cirsium vulgare
Cirsium arvense
Conyza canadensis
Crepis capillaris
Crepis biennis
Gnaphalium ulginosum
Hieracium pilosella
Hypochoeris radicata
Inula conyza
Lactuca serriola
Leontodon hispidus
Pulicaria dysenterica
Senecio squalidus
Senecio jacobaea
Senecio sylvaticus
Solidago canadensis
Sonchus arvensis
Tanacetum vulgare
Taraxacum vulgare group
Tragopogon pratensis
Tripleurospermum maritimum/inodorum
Tussilago farfara

CONVOLVULACEAE
Calystegia sepium
Convolvulus arvensis
Cuscuta epithymum

CRASSULACEAE
Sedum acre
Sedum album
Sedum reflexum

CRUCIFERAE
Alliaria petiolata
Arabidopsis thaliana
Armoracia rusticana
Barbarea vulgaris
Diplotaxis muralis
Diplotaxis tenuifolia
Lepidium heterophyllum
Lobularia maritima

Cardamine hirsuta
Capsella bursa-pastoris
Cardaria draba
Raphanus raphinastrum
Sisymbrium officinale
Sinapis arvensis

CUCURBITACEAE
Bryonia cretica (= dioica)

DIPSACEAE
Dipsacus fullonum
Knautia arvensis

EUPHORBIACEAE
Mercuralis annua
Euphorbia peplus
Euphorbia amygdaloides

FAGACEAE
Quercus robur
Quercus cerris

FUMARIACEAE
Fumaria officinalis

GENTIANACEAE
Centaurium erythraea

GERANIACEAE
Erodium cicutarium
Geranium dissectum
Geranium molle
Geranium pratense
Geranium robertianum

GUTTIFERAE
Hypericum perforatum
Hypericum hirsutum

LABIATAE
Ajuga repens
Ballota nigra
Betonica officinalis
Clinopodium vulgare
Glechoma hederacea
Lamium purpureum
Lamium alba
Prunellia vulgaris

LEGUMINOSAE
Colutea arborescens
Cytisus (Lembotropis) nigricans
Cytisus (Sarothamnus) scoparius
Lathyrus latifolius
Lathyrus pratensis
Lotus corniculatus
Lupinus sp.
Medicago lupulina
Medicago sativa
Melilotus alba
Melilotus officinalis
Onobrychis viciifolia
Ornithopus perpusillus
Trifolium arvense
Trifolium campestre
Trifolium dubium
Trifolium hybridum
Trifolium pratense
Trifolium repens
Ulex europaeus
Vicia angustifolia
Vicia cracca
Vicia hirsuta
Vicia sativa
Vicia sativa nigra
Vicia sepium

MALVACEAE
Malva sylvestris
Malva moschata

ONAGRACEAE
Chamaenerion angustifolia
Epilobium hirsutum
Epilobium montanum
Oenothera erythrosepala
Oenothera biennis

OROBANCHACEAE
Orobanche minor

PAPAVERACEAE
Papaver dubium
Papaver lecoqii
Papaver rhoeas
Chelidonium majus

PLANTAGINACEAE
Plantago major
Plantago lanceolata
Plantago media

POLYGONACEAE
Polygonum persicaria
Reynoutria japonica
Rumex crispus
Rumex acetosa
Rumex acetosella
Rumex sanguineus

PRIMULACEAE
Anagallis arvensis

RANUNCULACEAE
Aquilegia sp.
Clematis vitalba
Ranunculus acris
Ranunculus bulbosus
Ranunculus ficaria
Ranunculus repens

RESEDACEAE
Reseda lutea
Reseda luteola

ROSACEAE
Agrimonia eupatoria
Crataegus monogyna
Geum urbanum
Malus spp.
Potentilla anserina
Pontentilla erecta
Potentilla reptans
Prunus domestica
Pyrus communis
Rosa canina
Rubus spp.
Sanguisorba (Poterium) minor
Sorbus aria
Sorbus aucuparia
Sorbus intermedia

RUBIACEAE
Galium verum
Galium aparine

SALICACEAE
Populus tremula
Salix alba
Salix caprea
Salix cinerea
Salix fragilis
Salix caprea × cinerea

SOLONACEAE
Solanum dulcamara

SCROPHULARIACEAE
Chaenorhinum minus
Linaria repens
Linaria vulgaris
Linaria repens × vulgaris
Verbascum nigrum
Verbascum thapsus
Veronica arvensis
Veronica chamaedrys
Veronica persica

ULMACEAE
Ulmus procera

UMBELLIFERAE
Aegopodium podagraria
Anthriscus sylvestris
Angelica sylvestris
Conium maculatum
Daucus carota
Foeniculum vulgare
Heracleum sphondylium
Pastinaca sativa
Pimpinella saxifraga

URTICACEAE
Urtica dioica
Urtica urens

VIOLACEAE
Viola odorata

CYPERACEAE
Carex hirta

GRAMINEAE
Agrostis tenuis (capillaris)
Agrostis stolonifera
Aira carophyllea
Aira praecox
Agropyron repens
Arrhenatherum elatius
Avenula pratensis
Bromus lepidus
Bromus sterilis
Dactylis glomerata
Festuca ovina tenuifolia
Holcus lanatus
Holcus mollis
Hordeum murinum (secalinum)
Lolium perenne
Phleum pratense bertolonii
Poa annua
Poa compressa
Poa pratensis
Sesleria caerulea
Vulpia bromoides
Vulpia myurus

LILIACEAE
Allium vineale

JUNCACEAE
Juncus effusus
Juncus inflexus
Juncus glomeratus
Luzula campestris

TABLE 2. Lichens from Feltham Marshalling Yard. Supplied by J. R. Laundon.

Cladonia cervicornis subsp. *cervicornis,* occasional amongst mosses. Fumarprotocetraric acid by thin layer chromatography.

C. chlorophaea, rare, only one plant seen; chemistry not studied.

C. coniocraea, occasional amongst mosses. Fumarprotocetraric acid by TLC.

C. diversa, several thalli (local). Usnic acid and zeorin by TLC.

C. fimbriata, occasional amongst mosses. Fumarprotocetraric acid by TLC.

C. floerkeana, scarce amongst mosses.

C. furcata subsp. *furcata,* rare — only a few tufts seen.

C. rei, occasional amongst mosses. Fumarprotocetraric and homosekikaic acids by TLC.

Evernia prunastri, two plants, 5 mm tall, on *Salix.*

Hypogymnia physodes, a few small plants, to 5 mm across, on *Salix.*

Lecanora conizaeoides, abundant on bark, especially *Salix.*

Parmelia sulcata, several plants, to 8 mm across, on *Salix.*

Peltigera didactyla, odd plants scattered about; sorediate.

Peltigera sp., scarce.

Trapeliopsis granulosa, local on coal remains.

Verrucaria muralis, rare on pebble. Spores colourless, simple, 15–25 × 10–11 μm; no pits.

Xanthoria parietina, scattered thalli on concrete.

A few other lichens on concrete were listed by Frank Dobson.

TABLE 3. Insects identified at Feltham Marshalling Yard by members of the Amateur Entomologists' Society over the past five years. It is not comprehensive as many of the groups have not been investigated in depth.

LEPIDOPTERA

Butterflies

BREEDING

NYMPHALIDAE
Small tortoiseshell
Peacock
Comma
Red admiral — migrant
Painted lady — migrant

PIERIDAE
Large white
Small white
Green-veined white
Orange-tip
Clouded yellow — occasional migrant on lucerne
Pale clouded yellow (1991)

SATYRIDAE
Meadow brown
Wall brown
Small heath
Speckled wood
Grayling

LYCAENIDAE
Common blue
Small copper

HESPERIIDAE
Large skipper
Small skipper
Essex skipper

VISITING THE SITE FROM ADJACENT BREEDING AREA — Brimstone and holly blue.

Moths

BREEDING

Hawk-moths — Eyed hawk, lime hawk, poplar hawk, elephant hawk, small elephant hawk.

Other species include puss moth, poplar kitten, emperor, wormwood shark, alder dagger, poplar grey, red underwing, five-spot burnet, six-spot burnet, burnet companion, chalk carpet. Some 50 species of Noctuidae, 20 species of Geometridae have been taken at MV light. There are a large number of Microlepidoptera present including many Crambidae, but no work has been done on these.

COLEOPTERA (beetles). The large and small stag beetles; *Carabus granulatus* (the only Middlesex vice-county record); species of Cerambycidae, Chrysomelidae, Coccinelidae, Silphidae, Staphylinoidea and Scarabaeidae.

DIPTERA (flies). Many species of Syrphidae, including the local *Volucella zonaria;* Tipulidae, Bombyliidae, Rhagionidae, all mainly associated with the floral content of the site.

HYMENOPTERA (bees, wasps, ants). A large number of long-standing anthills of *Lasius flava;* nests of *Lasius niger;* summer nests of *Bombus* species; solitary bees of the genera *Andrena, Halictus* and *Megachile; Vespula* nests and solitary wasps of the family Sphecidae.

ODONATA (dragonflies and damselflies). Species which breed in adjacent water bodies use the site for hawking after prey, feeding on the large numbers of insects visiting flowers on the site.

ORTHOPTERA (grasshoppers, etc.). Grasshoppers (Acrididae) are common on the site, two species of *Chorthippus* being identified. Bush crickets (Tettigoniidae) are represented by the oak bush cricket and the speckled bush cricket. Other species may also be present but have not been considered in detail yet.

Other orders present but not yet studied include **HEMIPTERA** (true bugs), **PLECOPTERA, NEUROPTERA, TRICHOPTERA** and **EPHEMEROPTERA,** many again coming from the adjacent water bodies.

TABLE 4. Birds recorded at Feltham Marshalling Yard.

Species noted during fieldwork, 9–10 May 1989 by the Ecological Advisory Unit

- Blackbird
- Blackcap
- Chiffchaff
- Grey partridge
- Linnet
- Magpie
- Woodpigeon
- Pheasant
- House sparrow
- Swallow
- Willow warbler
- Lesser whitethroat
- Whitethroat

Breeding species (data supplied by LWT, 12 June 1989)

- Skylark
- Meadow pipit
- Cuckoo

Species observed feeding (data supplied by LWT, 12 June 1989)

- Green woodpecker
- Greater spotted woodpecker
- Lesser spotted woodpecker
- Goldfinch
- Greenfinch
- Bullfinch
- Carrion crow
- Jay
- Sparrowhawk
- Kestrel
- Tawny owl

Winter visitors (data supplied by LWT, 12 June 1989)

- Woodcock
- Fieldfare
- Lapwing
- Redwing

Book review

Of birds and men. Herbert Axell. The Book Guild, Lewes. 1992. 284 pp., many black and white illustrations. £14.95. ISBN 0 86332 747 8.

I have only met Bert Axell twice, but on each occasion two qualities have immediately become apparent — his huge enthusiasm for the task in hand, and his ability to transfer that enthusiasm to motivate others. Both those qualities shine through in this very readable autobiography, or, perhaps more correctly, an account of his life in so far as it relates to birds; but then most of his life *has* revolved around birds.

The book falls into three sections. The first nine chapters trace the author's boyhood interest in birds in and around his native Rye, birding experiences in Europe and north Africa during the Second World War and then his developing interest and expertise in conservation. This started with attempts at controlling predation on gulls and terns at Dungeness that led to his being invited to become warden at Minsmere with the renowned success that is now familiar in conservation circles around the world. Interspersed in this group of chapters are lively accounts of Dungeness Bird Observatory, a spell watching migrants on the Kentish Knock lightship and his experiences helping protect ospreys at Loch Garten, Kentish plovers and bee-eaters in southern England and, contrastingly *controlling* gulls in Suffolk. It represents a fascinating insight into the development of the interest in bird-watching and thence conservation that took off after the Second World War. It also succeeds in 'dropping' more names than I would have thought possible in a lifetime, never mind in half that span.

In 1975 the author became land use adviser to the RSPB and, in that capacity, toured most of the UK inspecting and advising on reserves. But his expertise, based on his success at Minsmere, was becoming known abroad. In chapters 10 to 12, he describes his, at times frustrating, experiences in helping to establish and develop reserves in Spain, notably, and resulting in much frustration, in the Coto Doñana. Here I first met him, trying to build a hide with insufficient nails and no Spaniard interested enough to drive the miles out of the reserve and replenish his stocks. (We were pleased to be able to meet that small, but intensely frustrating, need.) As well as advising in Spain there were sickening spells trying to help a tiny band of conservationists in Malta check the horrendous slaughter of migrants — but some progress was made against all the odds. The final three chapters are no more than a racy travelogue of a globe-trotting adviser — Honolulu, South-east Asia, the United States, Australasia — with lots more name-dropping.

What then to make of this book? The first nine chapters represent a fascinating and valuable source of information about the conservation movement in Britain in the fifties and sixties. The remainder is of less lasting interest, though the author's racy and almost breathless style makes for an easy read. But he has not been well served by his publisher. The text shows too many signs of sloppy editing which marr the otherwise easy flow of words and the reproduction and appropriateness of the photographs leave much to be desired. Seldom can Eric Hosking's masterpieces have been so poorly reproduced and why, for example, when describing migrant flocks of black terns in north Africa is there a photograph of one at a nest? The absence of chapter headings makes it difficult to find one's way about the book. But if you want a good read, especially if you have visited any of the many places described by Bert Axell, get hold of a copy of this book.

Peter Oliver

Some observations on the natural history of King George's Park, Wandsworth

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Summary

Irregular visits were made to King George's Park, Wandsworth between September 1972 and September 1984, and a hundred counts were made of its birds. Observations were made on other forms of animal life, and a list compiled of wild flowering plants. Changes in park management were noted, particularly the ill-fated attempt to establish belts of native trees in some of the greensward areas. The park was also visited in November 1992, by which time many physical changes had been made, some of which will no doubt have their effect on wildlife.

Introduction

King George's Park, Wandsworth is not in a part of London that lures the tourist. Its immediate surroundings are a squalid mixture of industrial and residential development of little architectural merit, disfigured, like so many parts of the inner suburbs, by litter, graffiti, neglect and vandalism. The park lacks the ambience of the central Royal Parks and the ornithological interest of the two nearest Inner London parks of any importance, Bishop's Park, Fulham, the subject of two papers by Strangeman (1966, 1975), and Battersea Park. Lying as it does in the bleak inner suburbs of the capital, it has not attracted the attention of many naturalists, but the late L. W. Cornelius wrote about its birdlife in the Society's *Ornithological Bulletin* in March 1967. As far as I know, his are the only published comments on its natural history.

My own observations were made because my wife's parents lived in Buckhold Road and their back garden (at TQ 254744) adjoined the park, making the latter a convenient place in which to exercise our dog. In the course of over a hundred visits between 1972 and 1984 I counted the birds, collected information on other forms of wildlife, and made notes on changes in the park itself. Exactly one hundred counts were made of the birds.

Over the study period the park was visited in every month of the year except July. Had my wife and I been living in London an effort would have been made to remedy this omission, and to ensure that some months, e.g. January and November, were given better coverage. Our occasional visits to the capital were, however, dictated by factors other than natural history, and I just had to fit observations in when it was convenient. As it happens, only during the summer period was the park rather neglected, with only 15 full visits during June and August. Spring visits (March to May) totalled 28, autumn visits (September to November) 32, and winter visits (December to February) 25. I have ignored the rule that the date of the equinox or solstice heralds the official arrival of the seasons.

It was not until 1978 that I considered the possibility of making use of the information being collected, and from then on my visits became more frequent and my notes more detailed. Sadly, our dog did not live to share my walks after 1981.

The park is administered by Wandsworth Borough Council. It was tentatively known as Southfields Recreation Ground until it was officially opened by King George V and Queen Mary on 28 July 1923, a day of 'pitiless driving rain' according to the local press.

Location

King George's Park lies to the west of Garratt Lane, and the River Wandle washes much of its eastern boundary. At the northern end, on the western side, are the council house gardens of Buckhold Road, while further south it is bounded by several little streets that lead into the busy thoroughfare of Merton Road. Buckhold Road, which branches off Merton Road, curves round the northern extremity of the park just before it disgorges its heavy traffic into Wandsworth High Street, while the southern end of the park adjoins a private sports field and is overlooked by a school. Kimber Road, which runs from Merton Road to Garratt Lane, cuts off the southernmost parts of the park, and the northernmost part is severed from the middle section by two broken lengths of Mapleton Road and a connecting footpath.

Thus is the park divided into three, as has been pointed out by Cornelius (1967). The middle block and the southern block, however, are each made up of two fenced areas. It is therefore more convenient, for recording purposes, to consider that the park has not three, but five, sections. I have called these, running from north to south, the 'Garden', 'North Field', 'Raised Field', 'Sports Centre' and 'South Field' (Figure 1).

In 1923 the park comprised only the 'Garden' and 'North Field', and had an area of 43 acres (nearly 17.5 hectares). It is now officially stated to cover 66 acres (nearly 26.75 hectares), excluding buildings and hard-surfaced areas. The park is just over three-quarters of a mile (*c.* 1,280 metres) long and is roughly 300 yards (275 metres) across at its widest part. The National Grid Reference for the northern end is TQ 255745 and that for the southern end is TQ 256734. For botanical recording purposes the 'Garden' and most of 'North Field' lie within the LNHS tetrad 27T44, with the rest of the park in 27T42.

The surrounding land is heavily built up, but the park is beyond the limits of Inner London as defined by Holte Macpherson (1929), a rectangle measuring eight miles by five, centred on Charing Cross. Wandsworth Common, Clapham Common and the two Inner London open spaces, Battersea Park and Bishop's Park, Fulham lie within a 4-km (2½-mile) radius. A kinder environment exists to the south-west. The southern end is only about one kilometre from the large, well-wooded gardens and tree-lined roads of the Wimbledon Park neighbourhood, and is about two kilometres from the semi-natural wilderness of Wimbledon Common.

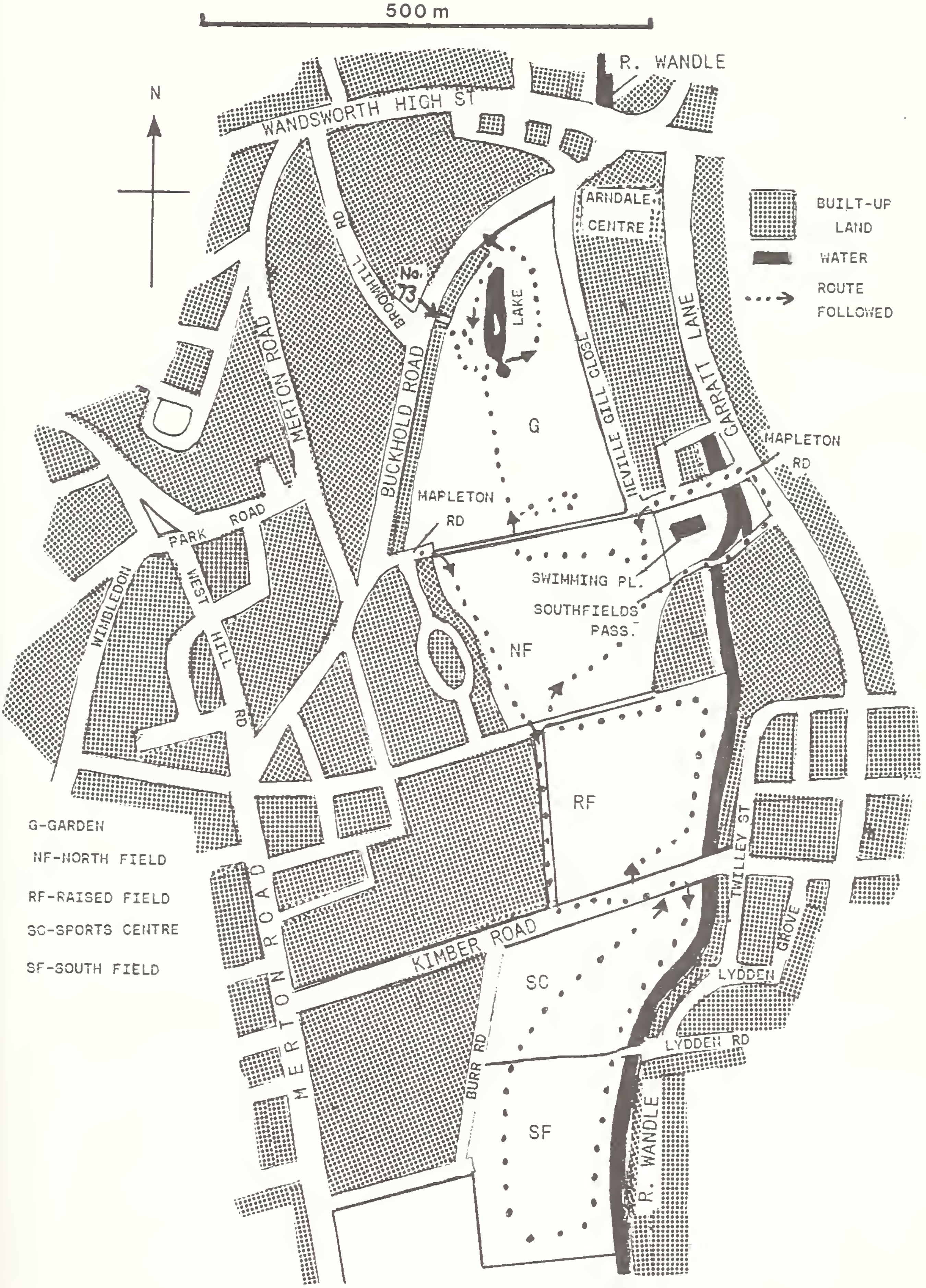

FIG. 1. King George's Park, Wandsworth.

Description of the study area

The past tense is often used in the following paragraphs for the following reason. Even during the period 1972 to 1984 the park underwent several changes, and there have been even more changes since. Some of the features may be more or less permanent, but others, trees and buildings for example, have a limited life. Some may have disappeared even before this paper appears in print.

The 'Garden'

The area north of Mapleton Road was laid out as a flower-garden with a lake. In 1923, when the park was opened, it was crossed by an aqueduct. This was demolished in 1968. Throughout my study period the east side of the 'Garden' was overshadowed by an Arndale Centre and three massive residential tower blocks. These were built in the 1960s on the site of Wandsworth Greyhound Stadium, and the culverted River Wandle, once visible from Buckhold Road, disappears beneath them after passing under Mapleton Road. Throughout my study period the park had facilities for tennis and putting, a fine bowling-green and colourful flower-beds. A garden for the blind was added to the amenities in 1973 and a children's pets corner was created in 1979 and opened in 1980. The garden for the blind was laid out with aromatic plants, some of which were in raised beds. By 1982, however, it had been given over to the cultivation of roses. Rabbits, guinea-pigs, goats and Jacob's and Soay sheep were the main inhabitants of the pets corner, the sheep also having access to a paddock adjoining the site and sometimes to the putting-green. There was also a small aviary.

From an ornithological point of view, the lake is the most important feature of the whole park. It is, unfortunately, typical of most municipal park waters of its period in that it has concrete banks. These are steep, but they do have a rough surface, which makes it easy for birds to leave the water. Normally there is no emergent vegetation, but in 1981 a praiseworthy attempt was made to remedy this deficiency, and in May of that year a few plants of yellow flag *Iris pseudacorus* and a species of *Juncus* were noticed rising from the water. No trace of these could be found when the park was visited in mid-September 1981. For at least two years, however, the bank here had provided a habitat for gipsywort *Lycopus europaeus* and skullcap *Scutellaria galericulata.* These survived the experiment.

The lake is surrounded by a fenced lawn, which gives the waterfowl and other birds a little seclusion. The photograph on the cover of the programme for the Royal Opening shows that in 1923 the fence did not exist, but railings had been erected by 1933, to judge from a photograph that appeared in the *Daily Sketch* in that year. Tall lakeside trees shown in the earlier photograph had been removed by 1933. Weeping willows *Salix alba* 'Tristis' grew on the banks during the 1972–84 survey, providing nesting sites for coots and moorhens where their pendulous branches touched the water.

There is an island in the lake which provides nesting sites and loafing spots for some of the waterfowl. Its banks are of similar design to those of the lake itself. In the earlier part of the survey period the island did not offer much cover for the birds. *Gunnera* and bamboo (? species) had been planted beside the existing weeping willow by September 1982, but the ground vegetation consisted mainly of stinging nettles *Urtica dioica.* Two hutches and a triangular shelter were noticed in March 1983.

At the southern end of the lake is an ornamental bridge across a narrow channel which connects with a small, willow-shaded pool. This was a favourite spot for people who came to feed the ducks and pigeons.

The lake is drained from time to time, and two of my visits coincided with this operation. The first was in April 1979, after the lake had been damaged by frost, and the second was in December 1982. On the second occasion the park staff, who tolerated my curious behaviour and were often helpful, allowed me to look at the mud that was being dredged out. I hoped I would find the empty shells of freshwater molluscs, having done so successfully in the 1950s when St James's Park lake was cleaned. I found nothing in King George's Park. My late father-in-law, Mr H. G. Hampton (hereafter referred to as HGH) saw grey herons *Ardea cinerea* taking fish from the lake when draining was in progress during the 1960s. Unfortunately I do not have the precise date of these occurrences and Wandsworth Borough Council has no record of the work being carried out.

Canada geese *Branta canadensis,* mallard *Anas platyrhynchos,* tufted duck *Aythya fuligula,* moorhen *Gallinula chloropus* and coot *Fulica atra* frequent the lake, black-headed gulls *Larus ridibundus* come here for food, and it was in this part of the park that one found the largest gatherings of house sparrows *Passer domesticus* and feral rock doves *Columba livia.* Other species of gulls, especially the common gull *Larus canus,* have been noted, and wild pochard *Aythya ferina* have been recorded. Besides the wild waterfowl there have, over the years, been mallard-related domestic ducks, muscovy ducks (the domestic variety of *Cairina moschata*) and farmyard geese. Full-winged ornamental wildfowl appear at times, and in 1981 and 1982 attempts were made to introduce pinioned native and exotic species of ducks. Details will be given later.

Throughout the study period there was a small rookery near the southern end of the lake. It was still in existence in 1992.

The weeping willows around the lake have already been mentioned. There were also pink-flowered Japanese cherries *Prunus* sp. here, and an avenue of these cultivars bordered the lakeside lawn on the west side. During the study period the taller trees in the 'Garden' included Lombardy poplars *Populus nigra* var. *italica* to the east of the bowling-green, and London planes *Platanus* × *hispanica,* common limes *Tilia* × *vulgaris* and a hybrid black poplar *Populus* × *canadensis* bordering Neville Gill Close, forming a line of trees sometimes used by roosting starlings *Sturnus vulgaris.* Sycamore *Acer pseudoplatanus,* more limes and a Dawyck beech, a fastigiate variety of *Fagus sylvatica,* occurred in the south-west corner. One lime was twice used by nesting carrion crows *Corvus corone.* Red oaks *Quercus rubra* grew near the gates in Buckhold Road. In 1979 the pets corner was planted with silver birch *Betula pendula,* rowan *Sorbus aucuparia,* horse chestnut *Aesculus hippocastanum,* a maple *Acer* sp., an alien alder *Alnus* sp. and an ornamental cherry *Prunus* sp.

I have included in the 'Garden' division of the park an abandoned nursery on the north side of Mapleton Road near the bridge over the Wandle, although separated from the main area by the southern end of Neville Gill Close and Mapleton Crescent. Its main interest lay in the variety of wild plants that grew there.

'North Field' (Figure 2)

'North Field' is essentially a recreation ground. Most of the area is a level expanse of mown grass. A few trees are scattered around the edge, and at the northern end there was a toilet block, a bandstand, and a nondescript building which, in 1954, was dignified with the name of 'pavilion' by the *Wandsworth Borough News.* In the north-east corner of the area is an open-air swimming pool, opened in 1938. It is surrounded by a lawn and fenced off from the rest of the park. This, and an adjacent grassy area, attracted ground-feeding thrushes *Turdus* spp., loafing mallard and resting gulls. Gulls also bathed in the pool itself. To the south of the enclosure was a bleak concrete children's playground, and south of this a footpath, known as Southfields Passage, leading to Garratt Lane.

Mature specimens of Swedish whitebeams *Sorbus intermedia,* sycamore, ash, beech, horse chestnut, cherry, lime and hawthorn *Crataegus monogyna* grew on the west side of the field, and until the 1970s there were common elms *Ulmus procera.* These were felled after they succumbed to Dutch elm disease; their trunks were being sawn up when I visited in September 1978. Horse chestnut, Swedish whitebeam, lime and false acacia *Robinia pseudoacacia* lined the east side of the field, with hawthorn, ash, horse chestnut and silver birch on a fenced-off bank in the south-east corner, south of the children's playground.

Lombardy and hybrid black poplars rose from the left bank of the Wandle, near the swimming pool, and holly *Ilex aquifolium,* dogwood *Cornus* sp. and

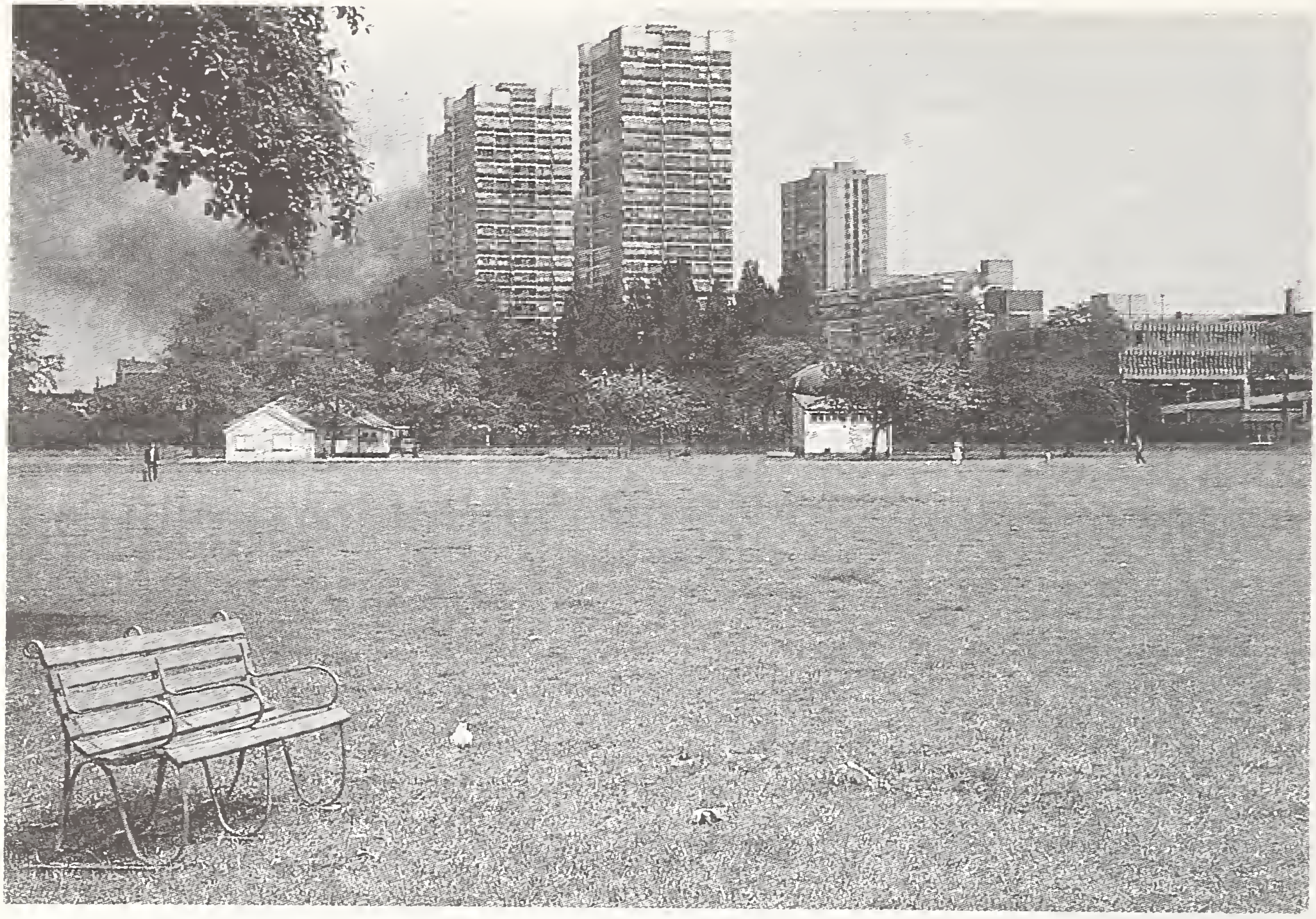

FIG. 2. 'North Field', a typical area of urban greensward, photographed looking north on 3 June, 1978.

weeping willow grew along the Garratt Lane section of the river. Near the bandstand there were cherries, hawthorns and a species of *Malus,* and there was a *Robinia* by Southfields Passage.

Several attempts were made to establish more trees, but they were repeatedly frustrated by vandals. Newly-planted standards were noted on both sides of the field in April 1979, but most of them had been destroyed by September. Common oaks *Quercus robur* were planted at the south end in 1980; they were dead by June. More planting took place in 1981, but on 28 May I found that 20 young trees out of a total of 46 had already perished; the survivors were mostly rowans. A good deal of new planting also took place early in 1983. On 19 March I saw about 100 young sallows *Salix* sp., elders *Sambucus nigra* and dogwoods *Cornus sanguinea* along the west side. Many of them were best described as 'whips' and they were arranged in groups, a refreshing change from regimented lines. The use of native species also marked a departure from the usual practice. More sallows and dogwoods were planted at the north gate, and there were elders, dogwoods and willows in the north-east corner. At least a dozen trees were damaged within two days and I was saddened to find on a visit made in September that nearly all the rest had gone.

Another, more modest, attempt to establish *Salix* was made early in 1984, and several new standards, including three Turkey oaks *Quercus cerris,* were noted on 25 April. A hawthorn hedge had also been planted against the garden fences that fringed the west side of the park. In September 1984, on my final tour of the park, I saw that several of the hawthorns were in a healthy state, but of the willow whips that had been planted only three fragments remained. One rowan was still alive in the south-west corner.

'Raised Field'

On its north side 'Raised Field' is partly bounded by 'North Field' and partly by a concrete fence, beyond which are factory buildings. Kimber Road forms the southern boundary, and the fenced-off River Wandle flows along its eastern side, overlooked by the back gardens of Twilley Street. On the west side there was a road-like metalled footpath flanked by yards and buildings. In 1978 I found field madder *Sherardia arvensis* growing in its gutter, this rather unexpected weed of lime-rich soils having escaped from the playing field. Burton (1983) suggests the plant could be introduced with lawn seed.

'Raised Field' was primarily a games pitch, but was occasionally used by visiting circuses. I have given it this name because its northern end is raised several feet above the level of 'North Field'. The southern end is level with Kimber Road, but at the northern end and along the western side there was a paved slope. The incline became less steep as one approached Kimber Road, but at the northern end the difference in level was so great that one had to climb the slope to get a good view of the greensward. There were occasions when it was not possible to enter the field and all observations had to be made from the outside.

Prefabricated houses were erected here after the Second World War and street maps published in the 1950s show three roads named Westgreen Way, Greenlea and Eastgreen Path. It was not until the mid 1960s that the site became a part of the park.

'Raised Field' did not have many trees. Before March 1980 there were 10 hybrid black poplars near Kimber Road, but five of these had been felled by the end of that month. Four Lombardy poplars and a rowan were planted here in 1982. At the north end there were small horse chestnuts, more hybrid black poplars, and limes. One of the limes was cut down in 1983, possibly by vandals.

On 19 February 1984 I noted that a plantation of over 200 birch, alder and willow whips had been created in the north-east corner, and at the end of April there were six new Turkey oak standards at the north end of the field. The plantation had suffered relatively little damage by then, but by September it had been almost completely obliterated.

'Sports Centre' and 'South Field'

These two sections of the park are considered together for they have several features in common. Together they form an area of just over seven hectares (17½ acres), mostly greensward, with the fenced and culverted River Wandle forming their eastern boundary. They lie to the south of Kimber Road and are divided from each other by a fence and a footpath linking Burr Road in the west with Lydden Road in the east. Lydden Road is reached by a footbridge over the river.

Before 1939 four acres (1.6 hectares) of the northern 'Sports Centre' half were used as a sports ground for Council staff, but during the Second World War the whole area was given over to allotments. After the war prefabricated buildings were erected along Kimber Road. The Burr Road allotments existed until 1958, and by 1961, when proposals for providing a sports centre were being considered, the former Council playing fields had been levelled, seeded and fenced. The rest of the land, north and south of the Burr Road–Lydden Road footpath, became part of the park in around 1959. A building to cater for the needs of football, cricket and squash players was erected at the south end of 'Sports Centre' in 1963 and was extended in 1981. The dumps of clay, soil and rubble that littered the site during building operations were colonized by a wide variety of plants.

When I started visiting the park there was an enclosed nursery in the north-east corner of 'Sports Centre', in the angle formed by Kimber Road and the Wandle. Its hedge of cherry laurel *Prunus laurocerasus* was a favourite haunt of greenfinches *Carduelis chloris*. By 1974 this nursery had become derelict and a mass of 'weeds', especially creeping thistle *Cirsium arvense* and black horehound *Ballota nigra,* and by the time of my next visit, on 4 September 1976, it had become an adventure playground. It was still frequented by greenfinches.

Sawn-up elm logs found a home here in due course, presumably moved from 'North Field', and by May 1980 the area had been extended southwards to include a small brick building. In September 1982, however, I found the playground littered with wood, mostly in the form of large battened boards, all broken, and there was a rubbish skip, crammed with burnt refuse. The following year saw the climbing structures demolished and debris piled up alongside the fence. For a while the gate was padlocked, and I was unable to enter the enclosure to get a close look at the vegetation by the Wandle, or lift up pieces of concrete and other rubbish to look for invertebrates. By February 1984 the site had been cleared of lumber and scraped clear of vegetation. The cherry laurel hedge had been cut to half its original height.

Neither 'Sports Centre' nor 'South Field' was very well endowed with trees. A *Robinia* grew at the west edge of the adventure playground and there was a wych elm *Ulmus glabra* to the west of the enclosure. Hawthorn, *Robinia* and lime lined the field by Kimber Road, and there were Lombardy poplars along the west side of 'Sports Centre'. Lombardy poplars also formed a line along the southern edge of 'South Field', while Swedish whitebeams grew along the north edge. The whitebeams attracted blackbirds *Turdus merula,* mistle thrushes *T. viscivorus* and woodpigeons *Columba palumbus* when they were in fruit.

Close-mown grassland was the main feature of both sections, and, if only seen on days when games were in progress or dog-walkers much in evidence, its ornithological importance might be dismissed as minimal. On quiet mornings, however, I often encountered flocks of linnets *Carduelis cannabina,* especially during March, and during severe winter weather skylarks *Alauda arvensis* and reed buntings *Emberiza schoeniclus* put in an appearance.

The River Wandle

Strictly speaking, the Wandle is not part of the park, but it would have been impossible to ignore its presence. Following its course from south to north, towards its confluence with the Thames, it is first seen through a chain-link fence

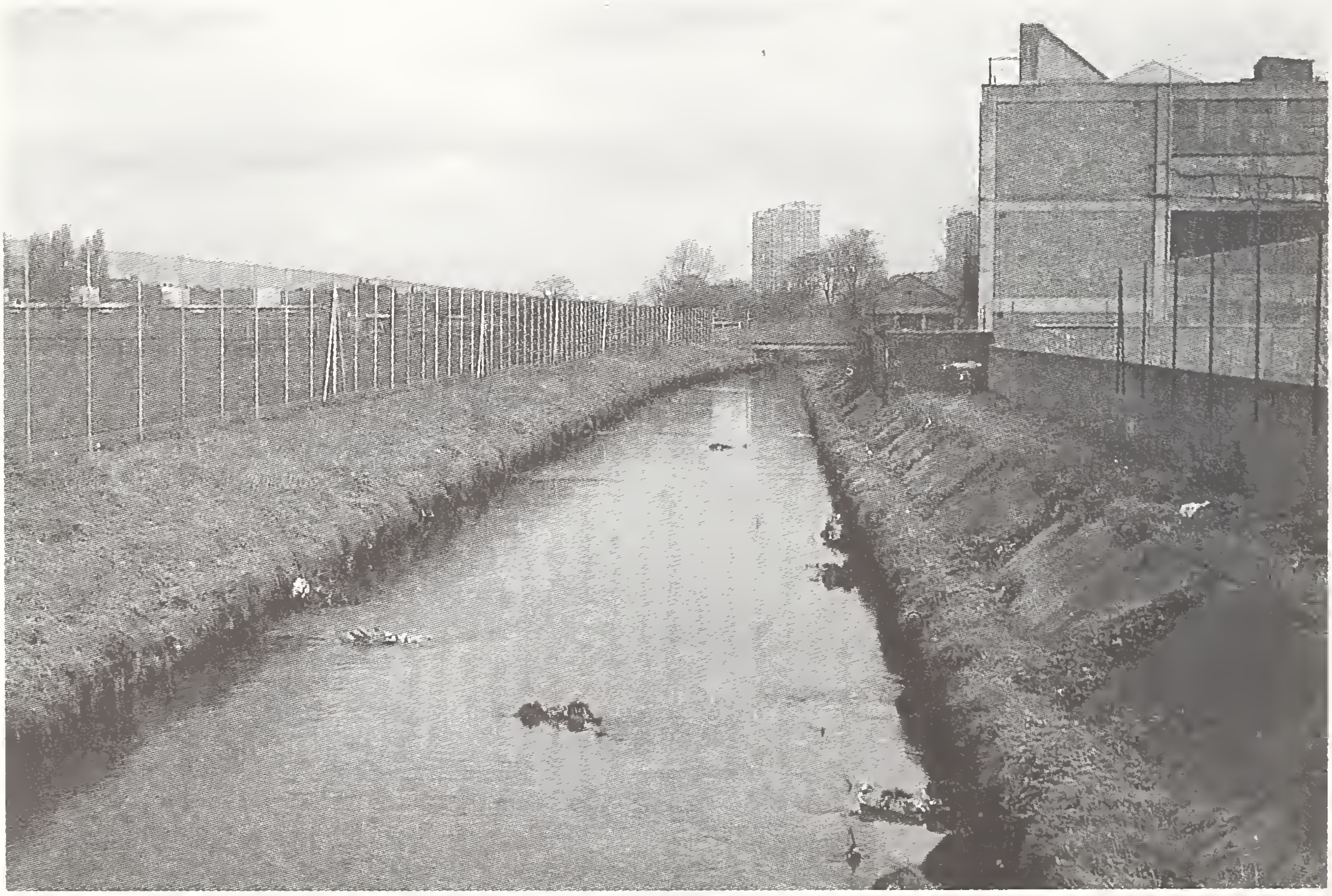

FIG. 3. The River Wandle, flowing alongside 'South Field', photographed looking north on 1 April 1980.

alongside 'South Field', with grim factory buildings on its right bank (Figure 3). This was a treeless stretch of river bank. Hybrid black poplars grew near the water as it passed 'Sports Centre' and the river here is overlooked by the back gardens of Lydden Grove. Those of Twilley Street line the right bank further north, alongside 'Raised Field'. There were more hybrid black poplars on the left bank here, and a few elders. The eastern edge of 'North Field' is not bordered by the Wandle, but during the survey period the river emerged from between buildings east of the children's playground to flow beside Southfields Passage to Garratt Lane. Here, making its way over its rubbly, litter-strewn bed, it passed a roadside shrubbery before slithering under the Mapleton Road bridge and disappearing under the tower blocks and the Arndale Centre.

The Southfields/Wandsworth stretch of the Wandle would not win a prize for beauty, but it is in a far better condition now than it was thirty years ago. Once a noted trout-stream, its lower reaches are said to have become the hardest worked stretch of river in the world (*The Times,* 27 April 1992). It provided power for corn and snuff mills, tanneries, iron-works and copper rolling-mills. Inevitably, it became polluted. In 1958 there were complaints about the malodorous river water affecting the lake (*Wandsworth Borough News,* 30 May 1958), and in 1970, even as far upstream as Morden Hall Park, where the Wandle flows through National Trust property, I recall seeing towering white castles of detergent foam riding on its brown, 'dead'-smelling waters. The latter years of the 1970s, however, saw a great improvement in water quality, and in January 1979 *The Observer* reported that a trout *Trutta* sp. had been caught at Southfields, the first since 1913 (Price and Price 1983). Now there are fish as far downstream as Wandsworth.

The Wandle, as seen from King George's Park, is ruler-straight for much of its length, and its banks are cased in bricks and concrete. I found the narrow, unmown strip of land that flanks its left bank between 'South Field' and 'Raised Field' to have some botanical interest, however, for it supported several plant species that were either scarce or ephemeral elsewhere in the park, or not found at all. They included horse radish *Armoracia rusticana,* wall rocket *Diplotaxis muralis,* bladder campion *Silene vulgaris,* cow parsley *Anthriscus sylvestris,* hemlock *Conium maculatum,* amphibious bistort *Persicaria amphibia,* goatsbeard *Tragopogon pratensis* and hairy sedge *Carex hirta.* Fool's watercress *Apium nodiflorum* and water mint *Mentha aquatica* grew in the water by Southfields Passage, and gipsywort *Lycopus europaeus,* fool's parsley *Aethusa intypus* and wild angelica *Angelica sylvestris* had established themselves on the river wall here.

A full list of the non-woody wild plants found here and elsewhere in the study area is given in Table 1.

Study method used during bird counts, and route followed

Birds were counted over the whole of the park on 100 occasions between 16 September 1972 and 22 September 1984. The majority of counts were made in the mornings, and mostly between 08.00 and 09.00 hours, this being a time of day when the games pitches were not in use. Care was taken not to start the tour before the starlings had returned from their Inner London roosts or the gulls from the reservoirs, or before the woodpigeon and house sparrow roosts had broken up. Canada geese often arrived while the count was in progress, and the area they frequented, the 'Garden', was counted last of all.

People were always present during daylight hours. Children crossed 'South Field' on their way to school and there were dog walkers about at all times of day, even well before eight o'clock. Dogs were supposed to be on a lead in the 'Garden', but elsewhere they ran free, sometimes without their owners.

Bird counts usually lasted between 50 and 80 minutes and the same route was followed whenever possible (see Figure 1). I entered the park at the north-west corner of 'North Field', and walked down the west side, surveying the games pitches. 'Raised Field' was first examined from the west side, from the paved slope if it were not possible to enter the area from the north side, as was often the case. On 31 May 1981 the whole area was closed when I reached it because a murder victim lay supine on the grass and the police were in attendance.

The gate to 'Sports Centre' was situated near the north-east corner, next to the site first occupied by the nursery and later by the adventure playground. The nursery could only be viewed from over the cherry laurel hedge, but it was usually possible to get into the adventure playground from the south end. I rarely saw it being used by children, probably because of the time of my visits. The Wandle banks were examined and an eye cast over the pitches to the west. 'South Field' was covered by walking alongside the fenced-off Wandle, crossing to the west side along the southern boundary, taking a look at the school allotment and games field, and then turning north again to leave by the gate in the north-west corner. 'Sports Centre' was re-entered to the west of the centre's building. I then headed diagonally across the pitches to the gate by the adventure playground. 'Raised Field' was re-entered from the south and the Wandle followed to the north-east corner. I left by the north gate if this was open.

The east side of 'North Field' and Southfields Passage were then investigated, and, after looking at the nursery in Mapleton Road, I returned to 'North Field' to count the birds around the swimming-pool and pavilion. I then went into the 'Garden' section, spent some time in the rose-garden/garden for the blind, circled the lake, visited the pets corner and left by the gate in Buckhold Road.

It was often necessary to go round the lake twice or even three times when counting the gulls and waterfowl, and sometimes another visit was made later in the day to check on the numbers of moorhens and coots. Moorhens were particularly elusive; some of them were likely to be hidden on the island when the first count was made.

The 'Garden' was left until last because its gates were likely to be locked if one made too early a start. By the time I reached it the gulls and feral rock doves would be there in force, taking advantage of the food provided by the public. One could also be certain of finding Canada geese. These birds usually flew into the 'Garden' while I was covering the more southerly parts of the park.

Birds

Systematic list

The order followed and the nomenclature used are that of Voous (1977). HGH = observations made by the late Mr H. G. Hampton of 73 Buckhold Road.

Grey heron *Ardea cinerea.* Herons were seen flying over, two on 29 April 1978 and single birds on 23 October 1982 and on 7 and 8 October 1983. Only on one occasion was one seen during a count.

Mute swan *Cygnus olor.* A cygnet, seen on 20 May 1973, had been introduced; it was fostered by domestic geese. An adult, present on the lake on 9, 11 and 12 December, had gone by the 15th. An adult, present on 30 March 1980, had gone by the following day. One was also seen on 1 May 1980.

Grey goose *Anser* sp. One flew north over 'Raised Field' on 6 April 1979.

Canada goose *Branta canadensis.* Cornelius (1967) does not mention this species, and it was not seen by me until 16 September 1972, when there was a gaggle of 12 on the lake. According to someone I met in the park on that day the birds had first appeared on 14 September. No geese were seen by me in 1973, 1974 or 1976, and I am unable to comment on their status in 1975 or 1977 since no visits were made in those years. In 1978 they were present on 13 out of 18 visits, with a maximum of 31 on the afternoon of 8 August. They were still far from regular in 1979, with a maximum of 35 on 9 and 11 December, but 1980 saw the start of breeding in the park and increased numbers outside the nesting season. One pair raised five goslings and numbers in excess of 50 were frequent from mid-August onwards, with a peak of 72 in October recorded by HGH.

A pair reared six young in 1981 and flocks were now of regular occurrence; HGH noted one of 62 on 24 August. At dusk the geese were seen flying south-westwards towards Wimbledon and north-eastwards towards central London. In 1982 an *Anser* × *Branta* hybrid was noticed between 16 June and 15 November. HGH's highest count for that year was 79, in August, but on 4 September I watched the hybrid and its apparent mate joined by a succession of skeins from the south until, by 10.07 hours, there were 97 in the park. No breeding took place in 1982 or 1983, possibly because the only residents were the presumably infertile hybrid and its partner. The maximum number counted in 1983 was 54, on 4 September. Only six visits were made in 1984. A pair nested on the island in April, but the result is not known. HGH, in a letter dated 1 August, said there had been no summer sightings of geese at all until 30 July, when he counted 41. The hybrid was not seen at all.

Except on 21 March 1983, when I saw a pair on the lawn in the swimming pool enclosure, all the counts were made of birds on or by the lake. Geese were seen flying over the games pitches to the south of the 'Garden', but to the best of my knowledge, they never alighted. I never found any of their easily recognizable droppings on the grass.

Mallard *Anas platyrhynchos.* Cornelius recorded '80 or so' mallard in the park, and stated that few pairs were successful in rearing young because of rats.

Mallard were recorded on every count. The lake and its surrounding lawns naturally constituted the main area they frequented, but I occasionally saw birds on the Wandle, on the bowling-green, in the swimming-pool enclosure and in the garden for the blind. Although they did at times exceed 100 in September and October, the average number seen (51) was well below the figure quoted by Cornelius. My highest count was 135 on 4 September 1976. The lowest numbers occurred in the spring. Only 14 were counted on 31 March 1980, with only five birds, all drakes, visible on the lake. Ducks may have been sitting on nests on the island or hidden in shrubberies and flower-beds, of course, but even if allowance is made for this, the total number of birds must have been very low. Ducks were always outnumbered by drakes, sometimes heavily, e.g. between 21 and 25 September 1978 the male to female ratio was 76:14, 57:12, 76:25, 86:20 and 50:18. Drakes were also in the majority during the breeding season, but I saw no cases of ducks being pursued and raped by parties of males — a common enough sight in the heavily-populated Inner London parks and the cause of some public distress.

Ducklings were seen in 1981, 1982 and 1983, but, as far as could be judged, the success rate was poor. The highest number of young seen on any one date was 18, made up of four broods. I cannot say whether rats accounted for any young birds. Carrion crows may well have done so, predation by cats is a distinct possibility, and foxes *Vulpes vulpes* could have taken a few. Human interference cannot be ruled out.

Pochard *Aythya ferina.* An unpinioned duck, present on the lake between 5 and 7 March 1980, had disappeared by the 8th. A pinioned pair had been introduced by December 1981, but the duck had vanished by June 1982. The drake may have survived longer, but after a period of confusion, I decided that the sightings I had of a drake in September and October 1983, and in April and September 1984, did not relate to this bird but to wild pochard, a single bird or perhaps more than one individual.

Tufted duck *Aythya fuligula.* Cornelius, writing in 1967, states that the 'first three' arrived on 16 January and that their numbers built up slowly to 22 by 13 February. I have not been able to establish whether this was in 1966 or 1967. Evidently they were not breeding in the park in Cornelius's time, but they did so throughout most of my study period, often with more success than the mallard. I did not, however, see ducklings in down until 1978.

Only three visits were made in 1972 and on one of these three juveniles were seen. They could have been bred in the park, but I cannot be certain. Only one visit was made in 1973, on 20 May, when three adults were present. Up to 17 frequented the lake in January 1974, but no tufted ducks were seen on 22 June when they should have been nesting. No visits were made in 1975 and on the one 1976 visit (4 September) the species was absent. No visits were made in the following year, but in 1978, after finding an absence of tufted ducks on 29 and 30 April and 31 May, I was pleased to see, between 7 and 11 August, two females with downy young, one brood of seven and another of three. Four juveniles seen on 11 and 21 September could have been survivors. I had no proof of breeding in 1979 and the species was often absent from the lake, but up to eight young were seen in July 1980. For 1981 I have only HGH's vague statement that 'quite a few' had bred, but 18 young birds were counted on 4 September 1982. HGH reported four families of eight to 10 each in 1983, which would indicate remarkable success, and I saw 16 young birds on 4 September, four of them still in down. No observations were made during the breeding season of 1984.

The success of the tufted duck was also reflected in the increasing frequency of its occurrence and the growth of its numbers. Admittedly, relatively few observations were made over the years 1972 to 1977, but the records were for days in January, May, June and September. Not more than 17 were recorded. Only two pairs were present in 1978, and in 1979 the highest figure I obtained was of 17 birds, on 15 February. In 1980 the species was always present, with up to 21 in May, but not more than six drakes and two ducks were seen in June. Up to 15 were noted in 1981, but in 1982 and 1983 the maxima were 28 and 45 respectively. The six visits made in 1984 yielded the following totals: 26 on 19 February, 39 on 25 April, 36 on 26 and 27 April, seven on 9 September and only three on 22 September.

Tufted ducks were occasionally found on the Wandle, and on two occasions a pair was seen on the open-air swimming-pool.

Kestrel *Falco tinnunculus.* Kestrels were not mentioned by Cornelius. They were seen on 13 occasions between 1978 and 1984, sometimes alighting on Knowles House, one of the tower blocks. This was, for a while, considered a possible nesting site, but it seems more likely that the birds used the old 'three-decker' school in Broomhill Road. Twice, in autumn, a kestrel was seen caught up in a flock of starlings performing an aerial pre-roosting display.

Moorhen *Gallinula chloropus.* Cornelius found this species breeding in the park and commented on the birds' aggressive behaviour. They showed no fear of the black-headed gulls and one was even seen to attack a rat.

Moorhens were seen on 97 out of 100 counts. On 16 February 1979 the lake was almost completely frozen, and on 9 December 1982 draining operations were in progress. These conditions probably accounted for the birds' apparent absence. On 1 June 1978, the third occasion when no moorhens were seen, it seems likely that they had taken cover, probably on the island.

Breeding certainly took place between 1978 and 1983, but no more than two pairs were present. The birds were only moderately successful; the highest number of juveniles seen was seven, in 1979. One pair chose to build under or in a weeping willow on the pool at the south end of the lake, and in 1979 the nest was made of sticks and paper, including paper bags. The 1980 nest was actually *in* the willow, about 30 cm (1 ft) above the water, and that of the following year was about 75 cm (2½ ft) up. In 1984 the site was taken over by a pair of coots.

The only occasion when a moorhen was seen away from the lake area was on 7 March 1980, when a juvenile appeared on the Wandle in the 'Sports Centre' section.

Coot *Fulica atra.* Cornelius did not record coots in the park, and I have no notes of them for 1972, 1973 or 1976. The species seems to have arrived between September 1976 and April 1978, when, on the 29th and 30th, a pair had a nest on the island. At least five young were on the water in May. They had, presumably, been hatched on the island, but on 1 June one of the adults was seen nesting at the north end of the lake, where a weeping willow branch touched the water. The presence of red-faced chicks in early August proves that a second brood was hatched. The exact number of young raised is in some doubt. Repeated counts produced different totals, and several circuits of the lake were made to try to make sense of the figures. The island made it impossible to scan the whole of the lake at once and the birds were very mobile. It was finally decided that there were seven chicks, with no sign of the earlier brood.

Up to five coots remained on the lake until at least mid-December, and two, presumably the breeding pair, were present in late February 1979, even though the water was mostly frozen over. Nesting took place in 1979, and in 1980 two pairs bred, one pair using the willow at the north end of the lake, and the other occupying a similar site at the southern end. A total of eight juveniles was seen on 24 June. Two pairs were nesting in 1981, but only one brood of red-faced chicks was seen (in June), and, although four adults were located on 17 September, only two juveniles were noted. A low water-level in March 1983 may have inhibited nesting, but by 16 June two white-fronted young were about. Only one pair was present.

In March 1983 small artificial platforms were noted at both the willow sites, presumably an official attempt to encourage nesting. Neither was in use and the water was again very low. Only one pair stayed to nest, but five juveniles were present on 4 September. Two pairs nested in 1984, one under the willow at the north end, and the other under a willow at the south pool, the site normally occupied by moorhens. Six birds were present in September, three of them well-grown juveniles.

Black-headed gull *Larus ridibundus.* This, as might be expected, was the commonest of the gulls frequenting the park. Black-headed gulls fed and rested on all the games pitches when disturbance there was at a minimum: they sometimes perched on the goal-posts on 'South Field'. When counting the birds allowance had to be made for those that deserted one pitch in favour of another. Some may have been counted more than once, but the number is not likely to be great.

Naturally, the species was most numerous in winter. Cornelius quoted a figure of 200+ for 14 December 1966. My highest total was 462 on 9 December 1978, with 304 gulls frequenting the lake and its lawns. This was exceptional. On only three dates did I count more than 400, and on only five other occasions did I record more than 300. The lake was a popular haunt because of the bread and other food that was dispensed there by members of the public, but there were times when the area was avoided, as on miserably cold days when the bird feeders stayed at home, or in late March when the birds were moving to their breeding quarters and only stopped for brief periods on the games pitches. In fact the gulls were more numerous in the 'Garden' than elsewhere on only 55 per cent of the counts. No black-headed gulls were seen in April, May or June, and no observations were made in July, when returning birds are normally seen in the London parks. Brown-necked juveniles were present in August.

The gulls paid relatively little attention to the Wandle, but they frequently congregated at the swimming-pool. One bird was seen perched in a willow on 15 November 1982, and one was perched in a hybrid black poplar beside the Wandle by 'Raised Field' on 19 February 1979. Tree-perching is not unknown in the Inner London parks, and Simms (1962) recorded it as regular in Gladstone Park, Dollis Hill. It is a common occurrence in Kelvingrove Park, Glasgow, where I saw as many as 36 perched in the willows in 1955.

Common gull *Larus canus.* Common gulls made their appearance between early August and early April, frequenting the games pitches, the lake, the swimming-pool on two occasions, and the putting-green on one. Numbers were usually low, but snowy periods, as in February 1972 and December 1981, caused a small influx, with between eight and 17 birds in the park. Thirteen seen on 29 March 1982 and 14 summer-plumaged birds counted on 21 March 1983 were presumably on passage. Only once, on 15 November 1982, was a common gull seen making a piratical attack on a black-headed gull — a common and long-established habit in the Inner London parks.

Lesser black-backed gull *Larus fuscus.* This was primarily a winter visitor, frequenting the pitches, the lake and, occasionally, the swimming-pool. Up to four were noted on 13 out of 16 December visits, and there were also sightings in November, February and March. Since September comes within the autumn passage period of this species and more visits were made in that month than in any other, it is perhaps surprising that these gulls were only seen on eight September dates. There was a party of 12 on 'South Field' on 16 September 1972, but on other days only one to three were recorded. Single, dark-winged birds, possibly of the Scandinavian race *L. f. fuscus* were seen on 11, 12 and 15 December 1979 and on 4 September 1983.

Herring gull *Larus argentatus.* Herring gulls rarely visited. Two were seen on 'Raised Field' on 9 December 1979, and two birds, behaving like a pair, frequented the lake in late March and early April 1982.

Feral rock dove *Columba livia.* Feral pigeons outnumbered all other species except roosting starlings and, on occasions, black-headed gulls, but the size of the population fluctuated a great deal. During bad weather, when their human benefactors were thin on the ground, they could be scarce or even completely absent. The highest number recorded was 385+ on 21 September 1978, but this was exceptional. Only on four other dates were there more than 300. The average number, based on 100 counts, was 136.

A pigeon was seen taking material to a nest on the underside of the Mapleton Road bridge on 16 June 1982, but as far as is known, none of the buildings in the park provided nest sites. A dovecote near the bowling-green was only occupied by ornamental domestic pigeons. The park was used as a feeding ground, a good deal of food being provided by members of the public visiting the lake. Flocks of over 100 were, however, often seen foraging on the games pitches. On 4 September 1983 a flock of about 100 on 'Sports Centre' was apparently feeding on knotgrass *Polygonum aviculare* agg.

Woodpigeon *Columba palumbus.* Woodpigeons were present at every count and were at times numerous. Over 25 were recorded on nine occasions in March, with as many as 57 on 8 March 1980. On 24 March 1981, when the total for the park was 32, a flock of 21 was noted feeding on 'Raised Field'. Numbers in excess of 30 were also seen on six September dates, when adults were joined by young birds. In 1982, of a total of 53 seen on 3 September, over 30 were juveniles, and of a total of 60 seen on 10 September 46 were juveniles. In December 1979, 33, 36 and 41 pigeons were counted on the 11th, 12th and 15th respectively. Few if any of the young birds seen could have been raised in the park; little nesting behaviour was noted. Cornelius blamed carrion crows for lack of success.

Woodpigeons were observed feeding on elm buds in April 1978, on haws in December 1980, and on Swedish whitebeam berries in September 1982 and October 1983. They also fed on bread around the lake, but unlike the woodpigeons in the Inner London parks they were never particularly tame. Roosting behaviour is mentioned elsewhere.

Collared dove *Streptopelia decaocto.* One flying over 'Raised Field' on 28 March 1981 was the only bird recorded during the study period. The residential area immediately adjacent to the park was too bleak to provide an ideal habitat for this species, but one would have thought that the livestock in the pets corner might have attracted birds from greener suburbs further afield. An increase in collared doves was reported in the Kingston/Surbiton area in 1981 (*Lond. Bird Rep.* **46:** 52) and breeding took place in Kew Gardens in 1984 (*Lond. Bird Rep.* **49:** 68).

Swift *Apus apus.* Swifts were noted overhead in May 1973, May, June and August 1978, June 1980, and May and June 1981. No more than four were seen at any one time.

Skylark *Alauda arvensis.* Skylarks were snowy weather visitors to the games pitches in 1979. On 15 February, 74 moved from 'Sports Centre' to 'South Field' and there were 70 more on 'Raised Field', making a total of 144. On the 16th only 14 could be found, 10 on 'South Field' and four on 'Sports Centre'. There was still snow on the ground on 17 and 19 February. On the former date there were 52 on 'South Field', 10 on 'Sports Centre' and 39 on 'Raised Field', a total of 101. On the 19th there were only 28, all on 'Raised Field'. The snow had gone by the 20th, but it remained cold and dull. There were two larks on 'Sports Centre' and 22 on 'Raised Field'.

Swallow *Hirundo rustica.* Swallows were seen flying over the park on only two occasions, three on 17 September 1972 and two on 1 May 1980, but one was also seen to the east of the Wandle, outside the park, on 2 May 1980.

House martin *Delichon urbica.* In the 1960s this species was probably nesting somewhere close to the park, for birds were seen overhead on several occasions during the breeding season. Cornelius does not mention having seen any during 1966, however, and during the study period they were only noticed in the late summer, in August 1978, September 1982 and September 1983, with a maximum of 10+ during the last of these periods.

Meadow pipit *Anthus pratensis.* One was seen in rough vegetation beside the Wandle by 'South Field' on 3 February 1974. In view of the large numbers of skylarks recorded during cold weather in 1979 it is surprising that this species was not recorded more often. It breeds close by on Wimbledon Common. Meadow pipits were regular winter visitors to Gladstone Park and the neighbouring allotments of Dollis Hill (Simms 1962).

Grey wagtail *Motacilla cinerea.* One was seen on the 'Sports Centre' section of the Wandle on 11 December 1979, and one was twice seen along the river by Southfields Passage in October 1982.

Pied wagtail *Motacilla alba yarrellii.* Single birds were seen on 14 occasions and two birds on two dates. Their occurrences were in May 1973, January 1974, August and December 1978, February, September and December 1979, March and April 1980, May

1981 and March 1983. The 'Garden' was their main haunt, but the pitches and the swimming-pool were also visited. A juvenile was seen on 4 September 1979, but the species is not known to have nested in the park.

Wren *Troglodytes troglodytes.* That this was a scarce bird can be explained by the lack of suitable cover, even in the 'Garden'. Wrens were seen or heard on only seven occasions; in November and December 1978, in March 1980, when one was singing by Southfields Passage, in October and November 1982, and on 25 and 27 April 1984, when one sang in the derelict nursery in Mapleton Road.

Dunnock *Prunella modularis.* One pair, sometimes two pairs, frequented the 'Garden', especially the neighbourhood of the bowling-green and the garden for the blind/rose garden. Song was frequently heard, and although breeding was not proved, it almost certainly took place. Cornelius came to the same conclusion.

Robin *Erithacus rubecula.* Cornelius saw robins 'from time to time'. My own records are all for the period September to January, suggesting an absence during the nesting season. Most of the records were for the 'Garden'.

Wheatear *Oenanthe oenanthe.* A migrating female seen on 'Raised Field' on 2 May 1980 was the only bird recorded.

Blackbird *Turdus merula.* Blackbirds were seen on every visit, with numbers of adults seen varying from one to 30. An increase in the breeding population was noted over the years, especially between 1980 and 1984, when it rose from *c.* 8 to *c.* 13 pairs. Nesting took place in the 'Garden', the part of the park which provided the most suitable sites. Cornelius considered the vegetation of the river-bank the main nesting area, but I could not confirm this. This species almost certainly depended on sites in private gardens adjoining the park rather than on the park itself. Juvenile birds were seen in 1974, 1978, 1980, 1981 and 1983, and adults were seen building and carrying food in April 1984. In late summer and autumn some birds took advantage of the fruit provided by hawthorn, Swedish whitebeam and *Malus* sp.

Fieldfare *Turdus pilaris.* Four were seen on 19 February 1979 in the 'North Field' section, one with two redwings on the swimming-pool lawn and three with one redwing on the games pitch. There was a little snow on the ground.

Song thrush *Turdus philomelos.* Compared with the blackbird the song thrush was a rare bird. I recorded it on only 15 dates, usually in the 'Garden', and more often in autumn and winter than in the breeding season. Cornelius reported them nesting, 'mainly in the vegetation on the river bank' in 1966. I saw a juvenile in the 'Garden' on 2 June 1981, and an adult with food in the 'Raised Field'/'North Field' area in April 1984. The maximum number of birds seen on any one day was four, on 28 October 1982.

Redwing *Turdus iliacus.* Up to four redwings were brought in by snowy weather between 15 and 20 February 1979 and were seen in all parts of the park except 'Raised Field'.

Mistle thrush *Turdus viscivorus.* Mistle thrushes were observed on 22 dates, but despite the fact that this thrush is at home in the mown grass/standard trees type of urban habitat, not more than one pair was confidently recorded in any year, although on 19 March 1983 a bird in 'Sports Centre' broke off singing to chase off another mistle thrush which had alighted on the grass near by.

One was seen carrying food in the 'Garden' on 31 May 1978, and a juvenile frequented 'Sports Centre' and 'South Field' in late May 1981. Swedish whitebeam berries were eaten, as were fallen *Malus* fruits near the bandstand in 'North Field'.

Spotted flycatcher *Muscicapa striata.* A bird on autumn passage was seen by the Wandle by 'Raised Field' on 4 September 1982.

Long-tailed tit *Aegithalos caudatus.* On 7 September 1982 seven flew from the former garden for the blind in the 'Garden' to the *Robinia* by the pavilion in 'North Field'.

Blue tit *Parus caeruleus.* Blue tits were recorded by Cornelius 'from time to time', and their status remained the same during my study period. One to three were seen on 38 occasions, mainly in autumn and winter, and in all parts of the park. There was no evidence of breeding.

Great tit *Parus major.* As might be expected of this species, less well adapted for urban life than the blue tit, it was of only occasional appearance. Single birds were seen on only eight occasions, all in autumn or winter. Four of the birds were seen by the Wandle and none in the 'Garden'.

Jay *Garrulus glandarius.* Jays were twice seen in the 'Garden' by HGH in 1980, one on 30 June and one on 5 July. I recorded single birds on 8 and 17 September 1972, and on 3 September 1982, when one was feeding on Swedish whitebeam berries in 'Sports Centre'. Although breeding annually in Inner London (Montier 1977), the jay is not a bird one normally expects in urban parks that consist mainly of games pitches. The birds seen in King George's Park were probably wanderers from Wimbledon Common.

Magpie *Pica pica.* Cornelius mentions a magpie that frequented the park for 'some months' in the summer of 1966. Although breeding on Wimbledon Common and in Richmond Park at that time, this species was an erratic visitor to the more austere inner suburban open spaces, and some birds seen were undoubtedly escapes from captivity. Gooders (1965) only recorded one magpie (in 1963) during his study of Clapham Common, and none at Wandsworth Common. Even at Kew Gardens breeding was only suspected for the first time in 1969 (Parr 1972), and the invasion of the Inner London parks did not take place until around that time. Breeding success in Inner London was not attained until 1971, when two young were reared in Kensington Gardens and a well-fledged youngster was seen in Regent's Park (Montier op. cit.)

My first magpie record for King George's Park was of one in the swimming-pool enclosure on 5 December 1981. By this time the species was well established in Inner London and too common in other parts of the built-up area to warrant detailed mention of its distribution in the *London Bird Report.*

During 1982 single birds were noticed in March and September, and two were seen in the sheep-pen in the 'Garden' on 27 and 28 October. What was believed to be a third bird was seen on 9 and 11 December. Single birds were seen in March and September 1983, but none subsequently.

Carrion crow *Crovus corone.* Crows were present on 91 counts and nesting records were obtained in 1973, 1974 and 1978–84. Observations were only made in September in 1972 and 1976, and no visits were made in 1975 or 1977. It would be reasonable to assume, however, that the species bred in the park throughout the study period. One pair remained faithful to the north end of the 'Garden', usually nesting in a plane tree, but using a hybrid black poplar in 1980 and a lime in 1982 and 1984. A second pair bred in the swimming-pool enclosure, occupying an elm in 1979 and 1980 and a hybrid black poplar in 1982. A third pair nested in a Lombardy poplar just outside 'South Field' in 1980 and 1981. This tree was decapitated in 1984.

At dusk on 15 November 1982 a total of 13 birds was seen flying south-westwards over the park, presumably to a roost. The movement lasted from 16.01 to 16.36 hours. Some of the birds alighted briefly in the trees at the north end of the 'Garden'.

Starling *Sturnus vulgaris.* Starlings were seen on 97 out of 100 visits. They fed in the park, collected food for their young there, and sometimes roosted there. I obtained no evidence that they nested there, however. The birds I saw picking up nest material flew to buildings beyond the park, but some of the park buildings could have provided sites, as some of the old elms might have done before they were felled.

Numbers seen on the counts varied considerably. Cornelius stated that there were 'not many' starlings in the park, and I counted fewer than 50 on 54 occasions. Weather exerted an important influence, with very few birds on frosty days and totals approaching or exceeding 100 after or during rain. The maximum number seen was 226 on 1 June 1978. Feeding flocks and birds collecting food for nestlings frequented the games pitches rather than the lawns in the 'Garden'; in fact the numbers seen in the 'Garden' during the counts only exceeded 20 on 14 occasions. Towards dusk, however, the birds could be present in their thousands.

House sparrow *Passer domesticus.* House sparrows were seen on every count. Cornelius considered them comparatively scarce, with an average of *c.* 80 birds present in January and February. My highest counts were 173 on 16 September 1972, 156+ on 3 January 1974, 152 on 4 September 1979, 146 on 27 October 1982, 219 on 13 December 1982 and *c.* 300 on 4 September 1983. The average number seen on 19 counts in 1978 was *c.* 62; in 1979 also 62 (15 counts); in 1980 *c.* 67 (18 counts); in 1981 *c.* 80 (12 counts); in 1982 *c.* 92 (18 counts); and in 1983 *c.* 117 (6 counts). The 1983 figure is, of course, distorted by the high total of *c.* 300 on 4 September and the small number of counts. There is not enough information here to suggest an increase or a decline in the species.

Higher counts could usually be obtained in September when the birds take advantage of the seeding grasses, the urban equivalent of the rural habit of resorting to the cornfields. Wallace (1961) recorded over 1,000 on the pitches in Regent's Park in September 1959 and I noted similar numbers in that park in the late summer in the 1950s and up to 450 on Blackheath in August 1957.

Chaffinch *Fringilla coelebs.* Chaffinches were not mentioned by Cornelius, and the bird was a rarity throughout the study period, occurring mainly in winter. HGH, however, heard one singing in the 'Garden' on 28 June and 6 July 1980. My own records are of a male on 'Raised Field' on 20 February 1979, during a cold spell, a female by the Wandle in the 'Raised Field' section on 8 December 1980, also during cold weather, a pair in the same area on 22 March 1981, a female on 'North Field' on 6 and 8 December 1981, and a male by the swimming-pool on 15 November 1982.

Greenfinch *Carduelis chloris.* Greenfinches were of frequent but rather irregular occurrence. They were recorded on 39 out of 100 counts and were most often seen in 'Sports Centre' in or near the cherry laurel hedge bordering what was at first a nursery and then the adventure playground. A flock of 12 appeared in 'Sports Centre' on 29 May 1981 and six or seven were present in the park on the 30th. Normally, however, two to four were seen, the birds also frequenting the 'Garden', the swimming-pool area, the pitches and the banks of the Wandle. A male was seen in song-flight in the 'Garden' on 21 March 1983, but no proof of breeding was obtained.

Goldfinch *Carduelis carduelis.* Goldfinches were recorded on 23 counts, usually in autumn and winter, but also on a few spring dates: on 23 and 24 June 1980, 30 May and 2 June 1981 (when a pair was suspected of nesting in a garden adjoining the west side of 'North Field'), on 16 June 1982 and on 25 and 27 April 1984. The seeding vegetation on the banks of the Wandle and in the adventure playground was an attraction, especially the burdocks *Arctium* sp. Usually only one to three were seen, but a total of 16 was recorded on 27 October 1982 and a total of 11 on the 28th. Only twice was one seen in the 'Garden', and one of these was in the derelict nursery in Mapleton Road.

Linnet *Carduelis cannabina.* I found this an intriguing species. It was seen on 22 counts and was confined to the mown grass area, the habitat that Baines (1986) has aptly described as a 'green desert'. I noted it in every month from January to June, in October and in December. It occurred as a hard-weather visitor in February 1979, with as many as 270+ on 'South Field' on the 15th after a snowfall, and 128+ scattered over the pitches on the 16th. The last 30 brids were seen on the 20th. Large flocks, of which more later, sought food on the pitches in March 1980, 1981, 1982 and 1984, and there were occasional records which suggested breeding in the neighbourhood. A pair frequented 'Sports Centre' on 23 June 1980, and there was another pair just outside the park, on the games field south of 'South Field', on the same day. Two cocks were seen on 'South Field' on 31 May 1981 and two birds appeared there on 16 June 1982.

The March birds were presumably on passage. In 1980 they were noted, usually on 'South Field' but also on 'Sports Centre' between 6 March and 1 April. Unfortunately no observations were made between 9 and 29 March inclusive, but before and after these dates the birds were seen as follows: 36 on 6.iii, 65-75 on 7.iii, *c.* 140 on 8.iii, 118 on 30.iii, 2 on 31.iii, and 60 on 1.iv. In 1980, 130+ were seen on 22.iii, *c.* 70 on 23.iii and 110+ on 24.iii. On 29 March 1982 a member of the park staff told me I had just missed a flock of over 60 and that the birds had been present on 'Sports Centre' in the early morning on 'every morning recently'. In 1983 I found 34 on 'Sports Centre' on 19 March and two there on the 21st.

Whilst living at Blackheath in the 1950s I frequently noted linnets on the games pitches at the south-east corner of the heath near The Paragon, with flocks of up to 140+ in March 1954. The only March record obtained by Wallace (1961) for Regent's Park in 1959 was of a single bird, but H. C. Holme and Professor E. H. Warmington saw 'unusually large numbers' in February and March 1953, with 40 staying until mid-March and *c.* 30 at the end of the month (*Lond. Bird Rep.* **18:** 33). Gooders (1965) reported that 53 spent March 1962 on Clapham Common. Both Gooders and Wallace saw their largest numbers in the autumn, but Wallace (1974) quotes a February 1960 record for Regent's Park of 213.

Reed bunting *Emberiza schoeniclus.* This species, although breeding on Wimbledon Common, occurred only as a hard-weather visitor. A cock, first seen on 'Sports Centre' on 15 February 1979, was later found on 'South Field' with a female. Two cocks were present on 'South Field' on the following day. There was snow on the ground.

Ornamental waterfowl

I have included this section to demonstrate the mobility of park waterfowl of other than truly wild origin. The situation in King George's Park no doubt reflects what is happening in other urban and suburban parks.

In the early years of my study period the only introduced waterfowl in the 'Garden' were farmyard birds, none of which could be described as 'ornamental'. On 20 May 1973 there were four muscovy ducks, four ducks of mallard ancestry, including one Indian runner duck, five domestic geese of greylag *Anser anser* descent and two Chinese domestic geese *Anser cygnoides* domestic variety. To this collection was added the mute swan cygnet already mentioned in the systematic list.

The number of muscovy ducks had increased to eight by January 1974, other domestic ducks numbered six, and there were still two Chinese and five other domestic geese. After June 1974 I tended to ignore the presence of these birds and I ceased to record them on every visit. I know, however, that muscovy ducks remained a feature of the lake throughout the study period and that there were as many as 12 of these grotesque birds on 17 September 1981.

On 7 December 1980 the lake was graced with the presence of a full-winged Chilean pintail *Anas georgica spinicauda* with a red ring on its right leg. It was seen again on the 8th and presumably over-wintered in the park, for I found it again on 22 and 23 March 1981. It was not seen on visits made in May, June and September of that year, but was back again by 5 December. By that date a pinioned drake wigeon *Anas penelope* and a pinioned pair of pochard had been introduced. Also present was a full-winged drake ringed teal *Callonetta leucophrys* which had apparently arrived of its own volition. There were further introductions. When I visited on 29 March 1982 there were, besides the wigeon, pochard, Chilean pintail and ringed teal, a shelduck *Tadorna tadorna* and a pair of ruddy shelducks *T. ferruginea*. On 16 June 1982 the wigeon, shelduck and ruddy shelducks were present, but only one pochard, a drake, was seen. This was then assumed to be the pinioned bird, but subsequent observations raised doubts. On 3 September *two* pairs of ruddy shelducks were present and one pair was full-winged. The shelduck, ringed teal, wigeon and a drake pochard were still around, and by 23 October they had been joined by the Chilean pintail. Only three of the ruddy shelducks could be found, but all four were present on the 30th.

The drainage of the lake in December 1982 caused some disturbance. On 13 December there was no sign of the wigeon, pochard or ringed teal. The shelduck and the pinioned ruddy shelducks remained on the water, but the two full-winged ruddy shelducks were seen flying over Buckhold Road. To the best of my knowledge they did not return, and there was no sign of the pinioned pair either when I next visited, on 19 March 1983. The shelduck, wigeon and ringed teal were also absent. A drake pochard was seen, but this was missing on the 21st, suggesting that it was full-winged. A drake seen at reasonably close quarters on 4 and 17 September and on 8 and 9 October seemed to have its primaries intact. The Chilean pintail was present on both October dates, but was not seen on the few visits made in 1984. The pochard was absent in February and April of that year, but present on 9 and 22 September, my last two visits.

Roosting

Moderate numbers of woodpigeons came in to roost in February, March, early April, October and December. They usually congregated in trees near the Arndale Centre: 56 on 5 April 1979, 70 on 30 March 1980 and 44 on 7 December 1981.

The park was on one of the starlings' fly-lines to Central London and its trees could be used as a gathering point and even, on occasions, as a roost. On 19 June 1980 a northward trickle of birds was noted over 'Sports Centre' and *c.* 300 were seen bursting out of the hybrid black poplars along the east side of 'Raised Field'. The starlings did not roost in the park on that date, nor on 3 September 1982, when they were seen assembling in the trees on the east side of the 'Garden' around 19.30 hours. Five days later several thousand came in from the south-west at 18.15 and spent some time in the trees at the north end of the 'Garden'. On 22 October 1982 hordes of birds swarmed over the park and the gardens of Buckhold Road, hundreds of them blackening the trees. Small flocks descended to feed on bread in the garden of No. 71. Streams of thousands poured in from the south-west, finally settling at the north end of the 'Garden'. The babble of their voices was still audible for a while after dark, but no sounds could be heard above the noise of the traffic at *c.* 19.45. A visit before dawn on the following day, however, confirmed that they had spent the night in the trees. They left between 07.30 and 07.35 on this, the last day of British Summer Time. In the evening on 23 October there was a spectacular aerial display over the park, reminiscent of the performance on July evenings over St James's Park (Cramp, Parrinder and Richards 1964).

The main gathering point was outside the park and was not located until later, but many birds alighted on the roof-ridges in Merton Road and on the roof and aerial of the school in Broomhill Road. They also settled on the roof and aerial of Knowles House to the east of the park before flooding into the park trees, first a rush of *c.* 2,600, then another 1,900 to 2,000, and finally, between 17.44 and 17.47, several small groups totalling *c.* 300. Thus there were nearly 5,000 birds involved. They left the park next morning between 06.27 and 06.40 GMT (BST having ended during the night). The majority headed south-west and a few flew to the south. On the following evening, 24 October, there was again an aerial display, with an estimated total of 8,200 birds.

On 27 October 1982 the main gathering area was located in garden trees and on rooftops between West Hill Road, Wimbledon Park Road and Merton Road, but the park was again the main theatre of aerial spectacle with, at one time, five large flocks in the air at once. They united to form a swirling, black, cylindrical cloud which stretched along the treetops and shed some of its load into the upper branches. Then, after a brief upsurge from the trees, a mass of *c.* 5,000, settled in noisily at 16.44. They were joined over the next few minutes by birds from the gathering point, making a total of around 7,400.

Similar movements were seen on 28 October, with a total of *c.* 7,000 birds, and HGH reported that 'large numbers' were still moving in at dusk up to 12 November, after which the weather turned cold. Starlings gathered in the park on 15 November 1982, however. Although for a few minutes the flocks wheeled in the air between the tower blocks, the display was on a much smaller scale than during October. Fewer than 1,000 birds were involved and the roost was not used.

The last observations were made on 7 October 1983 and the following morning. About 6,000 birds were seen, with a massive aerial display prior to roosting. The flocks started to burst out of the trees at 07.05 on the 8th, by which time starlings were returning to the suburbs from the Inner London roosts.

Mammals

Scientific and vernacular names are those used in Corbet and Harris (1991).

Hedgehog *Erinaceus europaeus.* Members of park staff told me that hedgehogs were sometimes seen in the 'Garden' after closing time, and they were certainly present in the mid 1950s when Miss Joyce Hampton, later to become my wife, walked her dog there in the evening. They also occurred in the Hamptons' garden, 73 Buckhold Road. I saw a vehicle-crushed body in Buckhold Road on 1 August 1962. The species is well-established in the inner suburbs and occurs much closer to the centre of London (Morris 1966).

Bat sp. A single vespertilionid bat was noted over the 'Garden' at dusk on 23 and 24 October 1982, while I was watching the starlings.

Fox *Vulpes vulpes.* Foxes occasionally visited the garden of 73 Buckhold Road and an area of waste ground between Buckhold Road and Merton Road, and HGH saw them entering the park. I caught the scent of a fox near the pets corner on 5 December 1981 and I found the remains of a domestic fowl with its quills bitten through on 3 September 1982.

Grey squirrel *Sciurus carolinensis.* Grey squirrels were resident in the neighbourhood of the park (e.g. in the grounds of Whitelands College, West Hill), but I only once saw one in the park itself, in the 'Garden' on 11 September 1972.

House mouse *Mus domesticus.* House mice must have been present throughout the study period. One was caught in a Longworth trap in the garden of 73 Buckhold Road on 15 September 1972, and one was seen there on several occasions in September 1978, at which time the garden lay adjacent to the park's pets corner, a good source of food.

Common rat *Rattus norvegicus.* Cornelius maintained that, in 1966, the banks of the lake and the rockery in the 'Garden' were infested with rats, and he considered them responsible for the scarcity of mallard ducklings. He also mentioned a moorhen attacking a rat. I remember seeing rats by the Wandle in the early 1960s, and I saw one crossing Buckhold Road on 15 September 1972, but in view of the breeding success of the coot and the tufted duck it seems likely that their numbers were reduced.

Amphibians

I did not obtain evidence of amphibians in the park. This is surprising, for common frogs *Rana temporaria* spawned in at least two garden ponds in Buckhold Road, on the side nearest the park. My in-laws' pond was one of these. It was very small, having been built on the site of an Anderson air-raid shelter, but it was regularly used throughout the study period by breeding frogs, common toads *Bufo bufo* and smooth newts *Triturus vulgaris.*

Fish

In answer to an enquiry I made in November 1992, Wandsworth Borough Council informed me that the fish in the lake included carp *Cyprinus carpio,* bream *Abramis brama,* ruffe (or pope) *Gymnocephalus cernua* and eel *Anguilla anguilla.*

The return of fish to the Wandle has already been mentioned. On 4 September 1983 fish were visible from the bridge in Wandsworth High Street, and also from the bank just north of Mapleton Road. Here a man and a boy were fishing. The man had caught five dace *Leuciscus leuciscus* that morning and had seen rainbow trout *Trutta irideus* landed on occasion. A neighbour of my in-laws, who was a keen angler, had sometimes supplied them with trout he had caught in this stretch of the Wandle. In September and October 1983 I saw a man fishing from the concrete slope below the back garden of his house in Lydden Grove, adjoining the 'Sports Centre' section of the park.

Invertebrates

My records of invertebrates in King George's Park are pitifully few. A public open space in a heavily built-up area is not the best place in which to be seen wielding a net, and close-shaven greensward is not the richest of invertebrate habitats. There is also a limit to what I can identify in the field.

I occasionally noted such common insects as the two-spot ladybird *Adalia bipunctata,* the hover-fly *Scaeva pyrastri,* the carder-bee *Bombus pascuorum* and the red-tailed bumblebee *Bombus lapidarius,* but my investigation was mainly limited to looking under rubble and other debris. Thus on 24 October 1982, under bits of concrete in the adventure playground, I found the woodlice *Androniscus dentiger, Philoscia muscorum* and *Oniscus asellus,* garden snails *Helix aspersa,* hairy snail *Tricia hispida,* and the yellow meadow ant *Lasius* *flavus.* A fourth species of woodlouse, *Porcello scaber,* was found under rubbish in the north-east corner of 'Raised Field', and a fifth species, *Armadillidium vulgare,* was found under rubble in the same place on 22 September 1984. On that date I also came across the common earwig *Forficula auricularia,* and collected two slugs which proved to be the garden slug *Arion hortensis* agg. and the netted slug *Deroceras reticulatum.*

Vascular plants

I started making casual notes of the flowering plants in 1974, and made a thorough search of the park on 21, 22 and 23 June 1980, when 90 species were found. Additional species, found before and after June 1980, bring the total up to 115. All these are given in Table 1. An experienced botanist would have added many more. Two inaccessible species in the Wandle went unidentified: a water crowfoot *Ranunculus* sp., and a more robust aquatic plant with long linear leaves. In addition to the herbs listed, a few self-sown alien trees and shrubs were noted: Swedish whitebeams by the Wandle in the 'South Field' and 'Sports Centre' sections, and false acacias and buddleia *Buddleja davidii* in 'North Field'.

The park's authority did not introduce wild flowers other than when the attempt was made to give the lake a more naturalistic edge at its northern end in 1981, but the fact that the skullcap and gipsywort were allowed to survive is to its credit. Many of the park's wild plants were ruderal species taking advantage of ground disturbed by building work or littered with rubble, or occurring at the side of paths, especially where the existence of a fence protected them from trampling.

The greensward, which accounted for most of the park's acreage, was too intensively managed to be of great botanical interest, but even here there was the *Sherardia,* and, when the bird'sfoot trefoil *Lotus corniculatus* was in flower, there were welcome patches of colour.

Flower-beds, which can be considered a form of disturbed ground, sometimes accommodated some of the less common 'weeds'. Thus can a shortage of gardening staff result in botanical diversity to excite the interest of the urban naturalist. Not that the 'Garden' presented an unkempt, uncared-for appearance. There was carpet-bedding in the Victorian tradition that was of high standard and the bowling-green was admirably maintained. Away from the 'Garden' and the games pitches, however, Nature was less likely to suffer interference. The adventure playground produced several interesting species before its final demise and clearance, and the concrete slope on the north side of 'Raised Field' boasted a fine patch of chicory *Cichorium intybus,* first discovered in September 1981 and still flourishing three years later.

The strips by the Wandle were clad in a mixture of tall waste-ground and hedgerow plants, together with a few marginal aquatic species. The increase in the number of wet-loving plants in and beside the river over the last few years was an encouraging sign of its return to health.

King George's Park in 1992

I revisited the park on 3 November 1992 and found much of it transformed. There were notice-boards displaying maps showing areas from which dogs were now banned and others where canine excrement had to be scooped up and placed in bins provided for the purpose. There were notices by the lake asking the public to refrain from feeding the birds. They showed a picture of a Canada goose and the other unwelcome animal likely to be encouraged by a surplus of bread, the rat. Needless to say both these pleas were being ignored. I saw two ladies dispensing bread in the space of ten minutes, and there were several unleashed dogs disporting themselves in forbidden territory.

Black-headed gulls, mallards, tufted ducks, Canada geese, coots and feral pigeons still jostled for food, but I saw no sparrows by the lake; in fact, I only found eight in the whole park. Tufted ducks, with a total of 35, outnumbered mallards on the lake, and there were some juveniles amongst them. There were also juvenile moorhens and coots. The only introduced waterfowl were domestic ducks and geese, but I saw no muscovy ducks. Feral pigeons seemed to be about as numerous as ever, at around 120. I saw two magpies in the 'Garden' and one at the other end of the park, on 'South Field'. I was told they were now breeding in the park, but I saw no old nests. I saw one, possibly two, grey squirrels, and was told this animal was now of regular occurrence. Foxes were also frequent visitors and I picked up the scent of one in the garden of 57 Buckhold Road after leaving the park.

Apart from the notices, the receptacles for canine excreta, and a few new standard trees, the 'Garden' looked much as it did during the study period. The pets corner was still in existence, with advice from the RSPCA on keeping rabbits, guinea-pigs and budgerigars attached to pens and cages. Other amenities — the bowling-green, tennis-courts, rose garden, etc. — were unchanged. The lake looked much the same as in 1984, with willows and nettles dominating the island. I saw no sign of the skullcap and gipsywort, however.

'North Field' was greatly changed. It, like other parts of the park south of the 'Garden', was bordered by a brick path. The unsightly pavilion, the bandstand and other buildings at the north end had been replaced by a well-planned and user-friendly children's playground. The old playground site near Southfields Passage was now occupied by the Wandle Recreation Centre, with a 'fitness suite' and a small games pitch. A nursery school was another new feature in this part of the park. Trees had been planted on both the east and west sides of 'North Field', limes, cherries, Norway maple *Acer platanoides* and, near the swimming-pool, hornbeams *Carpinus betulus*.

Southfields Passage was now a brick path, flanked on its north side by a shrubbery. Alders (possibly *Alnus cordata*) and willows now grew on a previously barren triangular tongue dividing two branches of the Wandle, and there was a riverside brick path along the Garratt Lane stretch. The Wandle here, and elsewhere, looked clean and healthy, and was free of litter. There were mallard on the water.

The ugly, paved slopes enclosing 'Raised Field' had been replaced by grassy banks and a brick wall, with a shrubbery along the fence-line. The old *Sherardia* site was now another brick path. There was a riverside walk on the east side of the field and a few new standards grew here on one of the sites where whips had been planted in the 1980s.

'Sports Centre' was entered by a path by the Wandle. The adventure playground site was occupied by a tarmacked cycle track, and hornbeams had been planted outside its fence. There was a sandy paddock at the east end of the building at the south end of this section of the park which was used by equestrians.

'South Field' was unchanged and was still a site favoured by black-headed, common and lesser black-backed gulls. The riverside strip, however, had been improved. Birch, sycamore, alder *Alnus glutinosa,* willow and oak had been planted on the Wandle side of the chain-link fence.

The park was a much tidier place than it was in the 1980s, which means that many ruderal plant species have disappeared. The banks of the Wandle had retained much of their former plant cover and they still had burdocks to attract the goldfinches. Elsewhere, however, the 'weeds' will have lost their habitat. Vandalism was obviously still a problem. I saw trees that had been wilfully damaged and noted that most of the boards displaying maps had been disfigured.

Discussion

The town parks created in the Victorian period and throughout most of the present century were not designed for wildlife. Their original purpose was to provide a green retreat for the urban population, a place for quiet recreation amongst trees and lawns, with formal flower-beds, shrubberies, conservatories, bandstands, statuary and, in some cases, fountain basins, lily ponds and ornamental lakes. Sometimes the landscaping was exciting and imaginative, but more often it was nothing more than the repetition of a standard formula with a few flower-beds, close-mown grass and standard trees as the main components. Later the need for space for organized games gave rise to the conversion of more land, including botanically interesting commons and grazing marshes, into dull, flat, ecologically impoverished expanses of monotonous greensward, all looking more or less like one another from one end of Britain to the other.

The last two decades have seen an upsurge of new ideas, both here and on the Continent, especially in the Netherlands. These years have seen the advent of the landscape architect and the local authority ecologist, a welcome flood of literature on the greening of the city, and the birth of conservation groups like the Ecological Parks Trust (now the Trust for Urban Ecology), the Urban Wildlife Trust in the West Midlands, the London Wildlife Trust, and many similar bodies operating in towns and cities all over Britain. The story is admirably told by Smyth (1987). The movement has the backing of English Nature, Scottish Natural Heritage, and the Countryside Council for Wales. Many new open spaces have been designed specifically for their wildlife interest and some local authorities have been persuaded to create wild habitats within existing parks by planting belts of native broad-leaved trees, setting aside areas for butterfly gardens and hay meadows, and providing wetland features with a more natural appearance than is the rule (Smyth op. cit., Goode 1986, Baines 1986, Campbell 1971).

To do this successfully the park's authority must have the approval of those who use the park. This is not always forthcoming. There are always those who regard any departure from the usual type of management as retrograde. They may now be in the minority, but it is a vocal minority. There is another obstacle; there is the physical resistance to change that takes the form of vandalism.

The creation of King George's Park pre-dates the green revolution by over half a century, and for most of its life it has been managed on conventional lines. In the 1920s parks were places where Nature was strictly controlled. In the Royal Parks the establishment of a committee to advise on the provision of bird sanctuaries was met with opposition and ridicule at parks management level and it continued to do so until at least the 1950s. The Government's abolition of the committee in September 1979 shows that that hostility was not dead.

But public attitudes towards wildlife and nature conservation have changed. In the 1920s egg-collecting was still regarded as a normal juvenile pastime, and finches were still being trapped for the 'fancy', albeit illegally, in places as near to King George's Park as Mitcham Common, as HGH could testify. When the park came into existence it could only provide a habitat for the most adaptable birds, and even these must have been dependent to some extent on neighbouring gardens or wasteland. Several species have since colonized the park which would have been regarded as comparative rarities in the inner London suburbs in the 1920s, notably the coot and the tufted duck. Greenfinches have become the most successful urban finch in recent years, and goldfinches have increased. Although no proof was obtained of goldfinches nesting during the survey, the frequency of their occurrence gives one to hope that they may eventually do so. The same might be said of the linnet, although its habitat requirements are more likely to be found alongside the Wandle than in the park itself. The magpie, which showed itself to be a likely colonist during the study period, has since nested in the park. The arrival of the Canada goose followed its spread in Inner London which took place after its introduction into Hyde Park and Kensington Gardens in 1955 (Montier 1977). Its numbers have now reached embarrassing proportions for Wandsworth Borough Council, one of whose officials has called the geese 'the thugs of the bird world' (Michael McCarthy in *The Times,* 3 January 1992). The ban on bird-feeding now in force is an attempt to discourage the species.

During my study period there were welcome signs in King George's Park that officialdom was aware of townspeople's need for a closer contact with Nature. The pets corner was opened and pinioned waterfowl were released on the lake. There is no doubt that urban children benefit from familiarity with domestic animals, especially children who are denied the pleasure and responsibility of owning a pet, and there is no doubt that waterfowl are a popular attraction. Although the practice is being officially discouraged, and not without good reason, it must be recognized that feeding the ducks does give people a great deal of satisfaction. Even monstrosities like muscovy ducks have their admirers, and pigeons and gulls also get their share of bread and affection.

In King George's Park a genuine effort was made in the 1980s to make environmental improvements. I have mentioned the work carried out at the north end of the lake in 1981 and the mass planting of whips of native species elsewhere in the park in 1983 and 1984. The first operation was frustrated by waterfowl and the second by mindless yahoos. Vandalism is rife in the vicinity of the park and manifests itself in other ways besides litter dumping, wholesale tree destruction and the use of the spray-can. In October 1982 one of the pets corner rabbits was found beheaded in a nearby garden.

In 1992 King George's Park provides a greater variety of recreational facilities for the residents of Wandsworth than it did when the study was started in 1972. This is as it should be; parks are for people. As a naturalist I regret that it has not been possible to do more to encourage wildlife, but I remain optimistic. The Council's Leisure and Amenity Services Department has greatly improved the south-west corner of Wandsworth Common, known as the 'Scope', and it has encouraged the development of Mist's Pitch in Battersea Park. The Department hopes to make another attempt 'in the near future' to transform the lake edge in King George's Park and carry out another tree-planting programme similar to the one that failed. One can only hope that next time its efforts will be crowned with success.

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TABLE 1. Vascular plants, excluding trees and shrubs, recorded in King George's Park, Wandsworth. Nomenclature follows Stace (1991).

A — adventure playground, B — more or less bare ground: flower-beds, C — concrete, D — dumps, E — enclosed bank, F — beside a fence, G — greensward, Ga — 'Garden', I — island, L — lakeside, N — old nursery, NF — 'North Field', P — paths, RF — 'Raised Field', S — paved slope, SC — 'Sports Centre', SF — 'South Field', W — by or in River Wandle, × — no record.

	Plants recorded 21–23 June 1980					**Additional plants noted before or after June 1980**					
	SF	**SC**	**RF**	**NF**	**Ga**	**SF**	**SC**	**RF**	**NF**	**Ga**	**Date**
Ranunculus repens	G	D	×	DF	×						
Ranunculus sp. (water crowfoot)	×	×	×	×	×	×	×	×	W	×	Sept. 1979
Papaver rhoeas	×	×	×	×	N						
Fumaria officinalis agg.	×	×	×	×	×	×	×	G	×	×	June 1982
Humulus lupulus	×	×	W	×	×						
Urtica dioica	BFW	D	DW	CFW	IL						
U. urens	F	BD	×	BD	BF						
Parietaria judaica	×	×	×	CW	×						
Chenopodium album	×	D	P	BD	NP						
Atriplex sp.	F	×	×	×	×						
Stellaria media	FG	G	×	BE	×						
Cerastium fontanum	×	×	×	B	G						
C. glomeratum	×	D	×	×	×						
Silene vulgaris	×	×	×	×	×	×	W	×	×	×	May 1981
Persicaria amphibia	W	W	×	×	×						
P. maculosa	×	B	P	BF	BF						
Polygonum aviculare agg.	×	BDG	GS	DG	×						
Fallopia japonica	×	×	×	B	×						
Rumex acetosa	×	×	×	×	×	×	×	×	×	G	May 1981
R. crispus	G	DW	GW	DEFW	G						
R. obtusifolius	×	D	DG	DW	N						
Malva sylvestris	GW	GW	DGW	DW	N						
M. neglecta	×	×	×	×	×	×	×	×	F	×	Sept. 1983
Sisymbrium orientale	×	W	S	×	×						
S. officinale	W	D	BSW	BCEF	N						
Armoracia rusticana	W	×	×	×	×						
Capsella bursa-pastoris	FG	D	BDS	CDEP	BFN						
Coronopus squamatus	G	×	×	BG	×						
C. didymus	×	D	D	×	×						

	Plants recorded 21–23 June 1980					Additional plants noted before or after June 1980					
	SF	SC	RF	NF	Ga	SF	SC	RF	NF	Ga	Date
Diplotaxis muralis	×	×	×	×	×	×	W	×	×	×	May 1981
Rubus sect. *Glandulosus* (*R. fruticosus* agg.)	B	×	W	BEW	LN						
Potentilla reptans	×	×	BGW	×	×						
Lotus corniculatus	×	×	DG	F	G						
Melilotus sp.	×	×	×	×	N						
Medicago lupulina	×	W	DG	B	B						
Trifolium repens	G	DG	BGS	EG	LN						
T. dubium	×	×	G	×	G						
T. pratense	×	D	G	×	×						
Epilobium hirsutum	×	×	×	BF	N						
E. montanum	×	×	×	F	×						
E. ciliatum	×	D	F	F	L						
Chamerion angustifolium	×	×	BF	BF	N						
Mercurialis annua	×	×	×	×	B						
Euphorbia helioscopia	×	D	×	×	N						
E. peplus	×	×	×	B	×						
Vitis vinifera	×	×	×	×	×	×	×	×	P	×	Sept. 1983
Geranium pusillum	×	×	×	×	×	G	×	×	×	×	Sept. 1982
G. molle	×	G	GS	×	×						
Erodium cicutarium	×	×	×	×	×	×	×	F	×	×	June 1982
Anthriscus sylvestris	FW	W	W	×	×						
Aethusa cynapium	×	×	×	×	×	×	×	×	C	×	June 1981
Conium maculatum	×	×	×	×	×	×	×	W	×	×	Sept. 1981
Apium nodiflorum	×	×	×	×	×	×	×	×	W	×	Sept. 1983
Angelica sylvestris	×	×	×	×	×	×	×	×	W	×	Sept. 1983
Heracleum sphondylium	W	×	×	×	×						
Solanum nigrum	×	×	×	×	×	×	×	B	×	×	Sept. 1979
Convolvulus arvensis	W	×	FW	BP	B						
Calystegia silvatica	F	×	×	E	N						
Symphytum sp.	×	×	×	×	×	×	A	×	×	×	May 1981
Ballota nigra	FW	ADFW	BDGW	×	×						
Lamium album	BF	×	D	EW	×						
L. purpureum	×	×	×	×	B						
L. amplexicaule	×	×	×	×	×	×	×	×	×	B	Sept. 1983
Scutellaria galericulata	×	×	×	×	L						
Prunella vulgaris	×	×	×	×	GL						
Lycopus europaeus	×	×	×	×	L						
Mentha aquatica	×	×	×	×	×	×	×	×	W	×	Oct. 1983
M. spicata	×	×	×	×	×	×	×	D	×	×	June 1982
Plantago major	BGW	DG	D	BDFG	×						
P. lanceolata	G	FW	DGS	EFW	N						
Veronica chamaedrys	×	×	×	×	×	×	×	×	×	G	May 1981
V. arvensis	×	×	×	×	BP						
V. persica	G	×	×	×	×						
Sherardia arvensis	×	×	BGS	×	P						
Galium aparine	F	F	DF	×	F						
Dipsacus fullonum	×	×	×	×	×	×	×	D	×	×	Sept. 1983
Arctium sp.	W	ADFW	W	CEF	×						
Cirsium vulgare	×	DW	W	B	LN						
C. arvense	FW	DW	D	DEF	FN						
Centaurea nigra	×	×	G	×	×						
Cichorium intybus	×	×	×	×	×	×	×	S	×	×	Sept. 1981
Lapsana communis	×	×	DW	EF	×						
Hypochaeris radicata	×	×	G	×	×						
Tragopogon pratensis	×	×	W	×	×						
Sonchus oleraceus	W	D	BDGW	BDFP	BFN						
Lactuca serriola	×	×	BW	F	N						
Taraxacum sp.	G	AF	BGW	CDF	GN						
Crepis vesicaria	×	D	BS	DFP	GL						
Aster sp. (Michaelmas daisy)	W	D	×	×	F						
Conyza canadensis	×	D	S	F	CF						
Bellis perennis	×	×	G	G	GL						
Tanacetum parthenium	×	×	×	×	×	×	×	×	F	×	Oct. 1983
Artemisia vulgaris	FW	DW	DSW	CDFW	N						
Achillea millefolium	G	DG	DGSW	G	GL						
Matricaria recutita	×	×	D	×	×						
M. discoidea	×	DP	GS	CDF	×						
? *Matricaria* sp. or *Tripleurospermum maritimum*	×	×	×	×	I						

	Plants recorded 21–23 June 1980					Additional plants noted before or after June 1980					
	SF	SC	RF	NF	Ga	SF	SC	RF	NF	Ga	Date
Tripleurospermum maritimum	×	×	D	D	GN						
Senecio jacobaea	×	D	G	×	×						
S. squalidus	FW	ADF PW	BDP SW	BCD FPW	FILN						
S. vulgaris	×	DW	D	D	BF						
Tussilago farfara	×	A	D	×	×						
Galinsoga parviflora	×	×	×	×	×	×	×	×	×	B	Sept. 1979
Carex hirta	×	×	×	×	×	×	W	G	×	×	May 1981
Lolium perenne	FGW	ADFG	DG	DEG	FGL						
Poa annua	G	GP	S	BG	N						
Dactylis glomerata	G	AF	×	×	×						
Arrhenatherum elatius	W	W	DW	×	×						
Avena sp.	×	×	×	×	N						
Holcus lanatus	W	D	×	D	G						
Agrostis stolonifera	W	D	×	×	×						
Alopecurus pratensis	×	×	×	×	×	×	×	×	F	×	May 1981
Bromus hordeaceus	×	×	BS	B	N						
Anisantha sterilis	W	D	×	×	N						
Elytrigia repens	G	D	D	×	N						
Hordeum murinum	G	ADFW	BGPW	CDFG	N						

Book reviews

Downland wildlife — a naturalist's year in the North and South Downs. John F. Burton and John Davis. 192 pp. ISBN 0 540 01259 9; and *West Country wildlife.* Kelvin Boot and Elaine Franks. 176 pp. ISBN 0 540 01261 0. George Philip. 1992. £16.99 each.

The Publisher's comment on the dust-jacket of each of these titles describes the content as an evocative account of nature throughout the changing seasons. Here there is the vital clue, for these are not dry expositions of the natural features of the two areas concerned, and thus the style and layout of the books is explained. Presumably, it is the publisher who has decided on the market as a justification for prettifying the books with blank pages headed 'Field Notes' as well as the irritating system of little inserted topics, not necessarily relevant to the specific area. Indeed there is a strange mix of the general and of the specific.

I know from personal correspondence that *Downland wildlife* could have had more scientific input. The author's style and approach are familiar to recent readers of *The London Naturalist.* I certainly would have appreciated more detailed content.

Devon and Cornwall, taken here as the West Country, have been treated in recent years to a series of picture and reference works which mean that this particular production is another in that line. This is the advantage for *Downland wildlife* since there has been little evocative writing with regards especially to the South Downs since the early part of this century. It is questionable whether any work has satisfactorily evoked the South Downs since W. H. Hudson's *Nature in downland.* Having just reread that book, I must admit that Hudson is often at his best as a social historian. This new work may confidently be expected to replace Hudson with regard to the natural history, but the sheer openness of the Downs has probably been lost since Hudson's time.

I have especially enjoyed the drawings and sketches by John Davis. Occasionally a darker hue than expected has been reproduced, but I would virtually recommend the book purely because of the illustrations. Several would make excellent prints!

Before I was asked to review these two books I had already ordered *Downland wildlife* and I have been delighted with that purchase. I saw *West Country wildlife* while visiting Bath shortly after it was issued. I decided then not to purchase and although I have enjoyed reading the book when a copy was provided, I have not changed my mind. I would though recommend purchase of *Downland wildlife.*

H. M. V. Wilsdon

Book reviews

The moths and butterflies of Great Britain and Ireland. A. Maitland Emmet and the late John Heath, eds. Harley Books, Colchester. Vol. 7, part 2. 1992. Several authors. 400 pp. £27.50 (paperback). ISBN 0 946589 42 9.

This volume, subtitled *Lasiocampidae – Thyatiridae with life history chart of the British Lepidoptera,* was reviewed in detail in *The London Naturalist* **70,** 1991. The reviewer, Colin Plant, considered then that the price of the hardback edition was well justified on account of Maitland Emmet's 243-page (plus 30-page index) life-history chart of the British Lepidoptera, together with the chapters on 'Classification of the Lepidoptera' and 'Resting posture in the Lepidoptera', regardless of the fact that the 31 species of moths included were part of the series.

This paperback edition contains minor revisions, including some taxonomic changes made since the hardback edition was published, and is good value for money for the three above-mentioned chapters alone. Indeed, it can be said to be the key volume of the entire 11-volume series.

The publishers deserve our full support for producing the series to such a high standard and we look forward to the appearance of the remaining volumes.

The spiders of Great Britain and Ireland. Michael J. Roberts. Harley Books, Colchester. **Paperback 2-part Compact Edition** and **Supplement,** 1993. **Part 1,** text, vol. 1, 229 pp. + vol. 2, 204 pp. + Appendix to vols 1 and 2, 16 pp. £49.95. ISBN 0 946589 44 5. **Part 2,** colour plates, 256 pp. £39.95. ISBN 0 946589 45 3. Complete 2-part edition £80. ISBN 0 946589 46 1. Separate **Supplement** (the Appendix) to hardback edition, 16 pp. £3.75. ISBN 0 946589 47 X.

This two-part, softcover, compact edition is a reprint of the original hardback volumes 1 and 2 (the text and figures) and volume 3 (the colour plates) which were reviewed in *The London Naturalist* **66,** 1987. To Part 1 the author has added a valuable Appendix to volumes 1 and 2 which contains corrections, alterations and additions to bring the British spider scene as up to date as possible. For those who already have the hardback volumes, the appendix is available as a separate supplement.

K. H. HYATT

Insects of the northern hemisphere. George C. McGavin, illustrated by Richard Lewington. Dragon's World, Limpsfield, Surrey. 1992. 192 pp. £18.95. ISBN 1 85028 151 3.

An ambitious project, in 'coffee-table' format, with a useful three-page glossary and a list of suggested further reading material. As an introductory book, it fulfils its claim, the range is impressive and the illustrations are beautifully executed. The ancillary matter adds to the interest, for example under gall wasps: 'Galls with a high tannin content have been used in tanning and dyeing processes; others for medicinal purposes. Some species of gall wasps are pests, while a few have been used in the biological control of weeds'.

Dr McGavin is Assistant Curator of the Hope Entomological Collections, Oxford University Museum, he lectures in zoology at Trinity College, Oxford, and has travelled widely in the tropics on research studies. His wide-ranging interests have shown him the interdependence of life on earth and the inevitable consequences of group extinctions. He is rightly enthusiastic about the variety, fascination and beauty of the world of insects, but I wish he had covered the wider term 'Invertebrates' which would then include the other orders in which this reviewer is more keenly interested.

The author communicates the taxonomy and invertebrate morphology in simple terms and the biological processes are lucidly described. The importance and interspecific relationships of insect life are touched upon and his admiration for them is very much apparent.

Collecting and mounting as precursors to study are noted briefly, but the omission of information on the preservation of specimens in a collection is felt to be regrettable; unprotected specimens soon fall prey to decomposition and destruction by other invertebrates, fungi and climatic conditions.

Some orders have only briefly been touched upon, but then this work *is* described as an introduction: if the reader were sufficiently interested, the whetted appetite would be served by reference to a suitable monograph. This book appears to be remarkably good value for its cost, and would be a welcome addition to any naturalist's bookshelves.

KEN HILL

Butterflies, dragonflies and Orthoptera in London's East End — population changes 1987–1992

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Summary

This paper records our observations on the butterflies and dragonflies of an inner city area, London's East End, in 1987–92. The redevelopment of many large wasteland sites since our 1984–6 survey has probably reduced the numbers of some open-ground butterflies, notably the small heath *Coenonympha pamphilus* and wall brown *Pararge aegeria*, but active habitat management, particularly in Tower Hamlets Cemetery Park, has allowed woodland-edge species to increase dramatically. The number of breeding species has increased from 19 in 1984–6 to 21, most of which are flourishing. The variety of dragonflies has been reduced by damage to one major site, the Canada Dock, but the Essex Filter Beds, just to the north of the survey area, now hold eight odonate species. Four species of orthopteran were also recorded in the study area. We discuss the ability of the insect groups studied to disperse and colonize distant sites and present evidence against the importance of 'green corridors'. The recent development of a network of local nature gardens, usually linked to schools, augurs well for East End wildlife.

Introduction

In 1984–6, we mapped the butterfly populations of the East End of London (E1, E2, E3, E14), recording 22 species, 19 of which were proved to breed (Murdoch et al. 1987). In 1984–8, we recorded observations of 11 species of dragonflies, five of which were probably breeding (Murdoch 1989). Since then, there have been major changes to the area. The Docklands boom is now over, but many wasteland sites along the River Thames, and most of the bomb-sites left over from the Second World War, have been developed. At the same time, quickening interest in urban nature conservation has led to the establishment of a network of local nature gardens and the development for conservation of two major sites, Tower Hamlets Cemetery Park and the Russia Dock area of the old Surrey Docks. There have been major changes in the populations of the butterflies and dragonflies of the East End which we document in this paper. Some observations on the orthopteran fauna are also included.

Description of the study area

The study area, the London Borough of Tower Hamlets, has previously been described (Murdoch et al. 1987). Briefly, it is an inner-city area lying on the north bank of the River Thames, with the City of London to the west and the valley of the River Lea to the east. It is surrounded by densely built-up areas, except where a 'green corridor' runs north up the Lea Valley, and a more broken one east down the Thames. The study area includes the Surrey Docks (SE16), as they occupy a bend on the south side of the Thames which juts into Tower Hamlets. We also include observations from the Essex Filter Beds (E5), one mile north of the study area in the Lea Valley; this site holds important insect populations, particularly of dragonflies, which could disperse to sites lower down the valley.

Until the mid-1980s, there was a belt of hot, dry, nectar-rich wastelands along the Thames which supported large populations of several butterfly species (Murdoch et al. 1987); they were probably the most interesting and distinctive of any East End habitats, with a mean summer temperature which might compare with a southern chalk downland. Sadly, most of these sites are no more, though there are still several on the Isle of Dogs, notably an arid four-hectare site along Spindrift Avenue, E14. Elsewhere, there is a small area (of about one hectare) along Wapping High Street, E1; several in the central part of the Surrey Docks, now fast disappearing; and small sites by the Regent's Canal off Commercial Road, E14, and around St Paul's Way, E3. Several small wastegrounds in Bethnal Green, E2, were 'tidied up' in 1988–90, followed by old bomb-sites at Cavell Street and Stepney High Street in Whitechapel, E1, in 1991–2. The Stave Hill Ecological Park, adjacent to the Russia Dock woodlands, and the rough grassland of the Mudchute, on the Isle of Dogs, E14, are open areas preserved for recreational use and actively managed for their wildlife interest. Less than one hectare of rough grassland is permanently preserved round the northern entrance to the Blackwall Tunnel, E14. Along the River Lea, Thames Water Authority damaged much of the riverside meadows at Mill Meads, E15, in 1992, by removing topsoil for major sewage works. Several other nearby sites look promising, but have no public access. The wastelands along the Northern Outfall Sewer at Old Ford Lock, E3/E15, are mostly intact, but an area of dry grassland much favoured by small heaths *Coenonympha pamphilus* was developed in 1991. The municipal parks (notably Victoria Park and Mile End Park) are still unfortunately 'green deserts' (Baines 1986). Private gardens are rare and probably provide very little suitable habitat.

On the credit side, enlightened management has transformed much of Tower Hamlets Cemetery park, E3 ('the Cemetery'), previously a gloomy woodland dominated by sycamores *Acer pseudoplatanus,* by opening up glades, planting a wider variety of shrubs and encouraging nectar sources such as red campion *Melandrium dioicum,* ox-eye daisy *Chrysanthemum leucanthemum,* dandelion *Taraxacum officinale,* cherry plum *Prunus cerasifera* and sallow *Salix caprea.* The Cemetery is complemented by Bow Triangle, an adjacent three-hectare area of rough grassland and scrub, which is sadly due for redevelopment in 1993. The open woodlands planted along the line of the old Russia Dock (in the Surrey Docks) in the early 1980s have matured; with the shallow pools previously described (Murdoch 1989), the Stave Hill Ecological Park, Lavender Pond Nature Park and the remaining Surrey Docks wastelands, they form an attractive and extensive habitat mosaic, of considerable interest for butterflies and dragonflies. The Russia Dock pools are relatively shaded and have little vegetation — mainly yellow flag *Iris pseudacorus* — but the Lavender Pond is more open and has a variety of aquatic plants, notably branched bur-reed *Sparganium erectum,* yellow flag, common sedge *Carex nigra,* water plantain *Alisma plantago-aquatica* and white water lily *Nymphaea alba,* with a fringe of reedmace *Typha latifolia* and reed *Phragmites communis;* its pH varies between

6.7 and 7.1. Unfortunately, the western bank of the nearby Canada Dock, which had been undisturbed for many years, was 'landscaped' in 1989 and has been an eyesore ever since. There is very little emergent vegetation along the canals, except at the eastern end of the Hertford Union Canal; but they might well be too polluted for most odonates except blue-tailed damselfly *Ischnura elegans*. The Essex Filter Beds, a grassland/freshwater nature reserve, lie on the eastern bank of the River Lea; on the other side of the river but adjacent are the Middlesex Filter Beds. They contain an interesting sequence of habitats, progressing from open gravel-pit through to advanced willow *Salix* invasion, and are now actively managed.

Most encouragingly, an increasing number of local nature gardens, usually linked to schools, have recently been established — at the moment there are at least 25 (Table 1). These sites are always very small (less than half a hectare), but they are usually carefully managed and potentially form a network of wildlife oases throughout the study area. Appropriate larval foodplants, purging buckthorn *Rhamnus catharticus* for brimstones *Gonepteryx rhamni* and garlic mustard *Alliaria petiolata* for orange-tips *Anthocharis cardamines,* have been planted by TJL, from 1981 onwards in the Cemetery and from 1984 in local nature gardens.

TABLE 1. Local nature gardens in the East End, 1993, with year of establishment*.

Attached to primary or junior schools	
Culloden, E14	early 1980s
Manorfield, E14	1981
St Luke's, E14	1982
Redlands, E1	1984
Stewart Headlam, E1	mid-1980s
St John the Baptist Junior, E2	1986
Olga School, E3	1989
Mowlem School, E2	1990
St Paul's with St Luke's, E3	1990
St Peter's, E1	1990
Holy Family Primary, E14	1991
Susan Lawrence Infants, E14	1991
Thomas Buxton Juniors, E1	1991
Christchurch, E1	about 1992
Elizabeth Selby Infants, E2	1992
Bonner School, E2	1993
(Cyril Jackson School, E14	recently destroyed)
Attached to secondary/special schools	
Bromley Hall, E14	1989
Grenfell, E1	1990
Mulberry School, E1	1993 (projected)
Community nature gardens/nature parks	
Cable St Community Garden, E1	1978
St Jude's Nature Park, E2	1980
Harley Grove Garden, E3	1987
Bancroft Road Nature Garden, E1	1990
St Leonard's Churchyard, E14	1993 (projected)
Larger sites in the Surrey Docks area	
Stave Hill Ecological Park, SE16	mid-1980s
Lavender Pond Nature Park, SE16	mid-1980s

*This list is likely to be incomplete and the dates are only approximate.

Survey methods

We have not attempted to map records on a 1 × 1 km grid as previously, but rather we have concentrated on following the fortunes of particular sites. We have used the same standard form as before to make the following observations:

Date, time and length of visit
Coverage of site
Weather (temperature, cloud cover, wind speed and direction)
Species and numbers
Interesting activities
Comments on the habitat

Counts of unidentified *Thymelicus* skippers and *Pieris* whites were also recorded, as these species cannot be confidently identified in flight.

Results

Weather

The weather has a major influence on numbers in many insect surveys. In the previous butterfly study, though the summers of 1983 and 1984 were hotter than average, 1985 and 1986 were much cooler and wetter, and butterfly numbers suffered accordingly. The extremely wet June of 1987 had a profoundly depressing effect on the whole season, though the fine weather in early July benefited some species, notably the large skipper *Ochlodes venata.* A cloudy, cool May 1988 and the heavy rainstorms of July 1988 (disastrous for the high-summer species) were partly mitigated by a pleasant autumn. After four miserable years, the magnificent 1989 season, with a very early spring and a gloriously hot high summer, at last gave populations a chance to recover. And 1990 was another fine year, with a very warm spring and a dry, hot late summer tempered by a cool, wet June. However, its successor, 1991, was only average, the cold, dull spring balanced by a warm and sunny August in which green-veined whites *Pieris napi* and meadow browns *Maniola jurtina* thrived. May and June of 1992 were memorably hot and dry, and brimstones and orange-tips did outstandingly well, but the rest of the summer was indifferent. Thus three of the last four seasons have been hotter than usual. Some butterflies, for instance the small copper *Lycaena phlaeas* and wall brown, appear to do particularly well in hot years (Heath et al. 1984), so observations from the last few years may give an overoptimistic view of their long-term status.

Systematic list of the butterflies with comments on species

ESSEX SKIPPER *Thymelicus lineola*

Status: found throughout the study area, often very common.

One of the most abundant butterflies of the 1984–6 survey, this species may have declined, perhaps through habitat loss, as the wasteland sites have disappeared, or possibly temporarily because of unsuitable weather conditions. It can be found in very large numbers: on the Mudchute on 28 July 1991, over 300 *Thymelicus* skippers were seen, probably all Essex skippers, as over 70 were positively identified as Essex and none as small skippers. We have now recorded counts of more than 100 Essex skippers from three wasteland sites (*con.* Plant (1987), who stated that almost all peak counts in London come from reservoir embankments).

SMALL SKIPPER *Thymelicus sylvestris*

Status: widespread but scarce.

The similarity of this species to the Essex skipper leads to underrecording, but it is almost always less common: the maximum count was of a mere eight on wasteland along Spindrift Avenue on 28 June 1992. It too has probably been affected by habitat loss, but at least eight colonies were known in 1992, so it is still widespread. Many of these sites are of the more ephemeral wasteland variety, but it was also recorded from the Cemetery and Old Ford Lock. Plant (1987) provides an elegant hypothesis for the scarcity of small skippers compared to the relative abundance of Essex skippers: Essex skippers breed mainly on cocksfoot grass *Dactylis glomerata,* an almost ubiquitous species on urban waste sites, but small skippers usually select grasses of the genera *Holcus* and *Phleum,* which may be less widespread. This botanical subtlety could explain why small skippers are rarely recorded from sites such as the Mudchute, which to the human eye look eminently suitable.

LARGE SKIPPER *Ochlodes venata*
Status: widespread and common.

Large skippers have increased and spread dramatically in the last six years. The highest count in the Cemetery in 1984–6 was only eight, but maxima of well over 100 were recorded there in the summers of 1987 and 1992 — partly as a result of better habitat management. Similarly, a single individual was found at Cavell Street in 1984–6, but in 1987 up to 15 were seen, and that year the species appeared in many tiny sites scattered through Bethnal Green. We therefore take issue with Plant's (1987) comment that large skippers are 'unable to thrive on many of the smaller sites': they are very widespread in good years. Habitat maturation and favourable weather conditions may both have contributed to this success — 1987 was a good year in Hampshire as well (Oates 1988).

LARGE WHITE *Pieris brassicae*
Status: found throughout the East End, often very common.

Not quite as abundant as the small white, but a common sight, whether in favourite sites such as the Mudchute or the Cemetery, or flying over a busy road. The maximum count was of 60 in the Cemetery on 7 August 1988.

SMALL WHITE *Pieris rapae*
Status: found throughout the East End, often abundant.

Probably the commonest butterfly in the East End, and certainly the most visible; often seen flying through completely built-up areas. Several counts of over 100 individuals were made in the Cemetery and on the Mudchute.

GREEN-VEINED WHITE *Pieris napi*
Status: scarce away from three well-established colonies.

Still most easily found in the three premier sites, the Cemetery, Old Ford Lock and the Mudchute, but also irregularly recorded from smaller sites such as St Jude's Nature Park and Wapping High Street. The summer of 1991 was outstanding, with 75 in the Cemetery on 13 August and *c.*100 in the Mudchute on 8 September; the cold, cloudy spring may have assisted larval survival.

BRIMSTONE *Gonepteryx rhamni*
Status: still a rarity, but several breeding records in 1990–2.

Three adults were seen in the Cemetery in the spring of 1987. The next records were not until 24 May 1990, when three small larvae were found on the Mudchute on recently planted purging buckthorn. In 1991, eggs or larvae were found on three occasions in the Cemetery and three adults were seen in the early autumn, nectaring on everlasting pea *Lathyrus latifolius;* a single larva was found in a school nature garden. In the spring of 1992, up to six adults were present in the Cemetery and eggs were found on at least forty buckthorn bushes; eggs or larvae were also located in seven widely separated sites scattered throughout the East End, with females twice (at the Mudchute and St Jude's Nature Park) actually watched laying eggs.

Plant (1987) stated that Brimstones 'avoid the urban zone completely, at least as a breeding species', but we recorded adults on three occasions in 1985–6 and found eggs four times (these records are not mapped by Plant (1987)). Our prediction in 1987 that brimstones were 'probably colonizing the East End' appears belatedly to be coming true, but it will be very interesting to see if a run of poor seasons reverses this trend.

ORANGE-TIP *Anthocharis cardamines*
Status: a colony becoming established in the Cemetery; possibly spreading elsewhere.

A single male in the Cemetery on 17 June 1987 was the only record from 1987 until May 1990, when a female was seen and seven eggs were found on garlic mustard in the Cemetery. Numbers then increased rapidly to a maximum count of 15 adults (and large numbers of eggs) in the Cemetery on 16 May 1992. Eggs or larvae were found in five other sites in 1992 (four of them local nature gardens), on garlic mustard and dame's violet *Hesperis matronalis*. A healthy colony has long been present in the Essex Filter Beds. These observations do not agree with Plant's assessment (Plant 1987) of an 'insect quite clearly avoiding the urban zone'. They have clearly benefited from the recent sequence of fine springs as well as the present abundance of the foodplant.

CLOUDED YELLOW *Colias croceus*

Status: an irregular visitor not seen every year.

Two sightings, both by K. Harris on the Mudchute: one in the first week of October 1987 and one on 6 September 1988. There were also several records in 1983, a vintage year nationally, but not in 1992, a fine year for this species in much of Britain.

SMALL COPPER *Lycaena phlaeas*

Status: well established at Old Ford Lock, irregular at several other sites.

Old Ford Lock is the most reliable site, but small coppers were also irregularly seen on the Mudchute (with a maximum of nine on 21 August 1990), the Cemetery and St Jude's Nature Park, with occasional individuals turning up almost anywhere. It is common in the Essex Filter Beds. This species does not form discrete colonies, but appears to be able to move around in search of the larval foodplants, sorrels *Rumex* spp.; Plant (1987) comments that it is 'equally at home in a largely urban environment as it is in its more pastoral settings', a comment with which we agree. It is definitely commoner than in 1984–6, but the better weather of the last four years may be partly responsible (Heath et al. 1984).

COMMON BLUE *Polyommatus icarus*

Status: still common and widespread, but probably reduced by habitat loss.

Common blues have suffered from the redevelopment of many wasteland sites, and probably also from habitat succession in others: for instance, a small colony at Cavell Street seems to have died out spontaneously. They were, however, recorded from four new sites in 1992, including Wapping High Street (less than 1 km from the City). The biggest colonies, at Mill Meads, Old Ford Lock, the Mudchute, and the Stave Hill area of the Surrey Docks, reach 30–100 adults at maximum. The local foodplants appear to be birdsfoot trefoil *Lotus corniculatus*, lucerne *Medicago sativa* and possibly red clover *Trifolium pratense*.

HOLLY BLUE *Celastrina argiolus*

Status: recently greatly increased; now common and widespread.

The years 1989 and 1990 were vintage years nationally for holly blues, and it was a joy to witness this population explosion throughout the East End — and even in the City of London. The colony in the Cemetery boomed, with maxima of 65 on 29 July 1989 and 73 on 14 July 1990 (compared to a high count of 15 in 1984–6). Individuals were often seen in transit through built-up areas or in local nature gardens, and, encouraged by the presence of mature ivy *Hedera helix*, eggs were discovered in sites such as St Botolph's Church, Aldgate, EC3. Eggs and a full-grown larva were noted on lucerne on the Mudchute in 1989–90. It was much scarcer in 1992, suggesting that it may be about to indulge in one of the major population collapses for which it is notorious (Heath et al. 1984).

RED ADMIRAL *Vanessa atalanta*

Status: a widespread migrant and opportunist breeder.

Recorded from many sites, large and small, with a maximum count of 12 on

15 September 1987 on waste ground off Armagh Road, E3 (destroyed four months later). The Mudchute and the Cemetery are the most regular sites, but red admirals can appear anywhere where there are buddleias *Buddleia davidii*. Larvae were also recorded widely — always on nettle *Urtica dioica*.

Painted lady *Cynthia cardui*
Status: uncommon migrant.

As noted in 1984–6, painted ladies can appear almost anywhere, but in some years they do not appear at all. The best year was 1988, when there were 11 records (of probably six individuals), but the highest count was of three at Wapping High Street on 14 July 1992.

Small tortoiseshell *Aglais urticae*
Status: widespread and common.

Small tortoiseshells can be found throughout the East End, as single individuals nectaring on a lone buddleia in a car park, or in substantial numbers on the larger sites, particularly where there are extensive nettle beds. They are now commoner and more widespread than in 1984–6; the low numbers in the mid-1980s may well have been caused by poor weather conditions. Their numbers are well known to fluctuate widely (Heath et al. 1984): 1992 was an especially good year, with high counts of 60 on the Mudchute on 4 May and more than 30 in the Cemetery and the Essex Filter Beds.

Peacock *Inachis io*
Status: rare but widely distributed.

Plant (1987) considered the peacock to be 'essentially a woodland butterfly', which may explain why it is much the rarest of the resident nymphalids in the East End. This was noted in our 1984–6 survey as well. Peacocks were recorded from 12 sites, most often from the Cemetery and the Mudchute (with occasional records from wastelands and local nature gardens), but only in ones and twos: the only count of three was from the Mudchute on 4 May 1992. Larvae were recorded on only three occasions, all on nettles.

Comma *Polygonia c-album*
Status: common and widespread.

Like small tortoiseshells, commas are undoubtedly commoner than they were in 1984–6, but again better weather conditions could be responsible. The highest count was from the Cemetery (25 on 5 April 1992), but they were recorded throughout the East End; singles were often seen in completely built-up areas, nectaring on buddleias or holding territory in local nature gardens. The only recorded foodplant in the East End is nettle.

Speckled wood *Pararge aegeria*
Status: now firmly established; two or three thriving colonies with scattered records elsewhere.

Speckled woods have increased dramatically, mainly because of the improved habitat in the Cemetery and the Russia Dock area of the old Surrey Docks. Until 1987, the maximum count from the Cemetery was four, and none was seen in 1988; but they increased rapidly from 1989, with a count of 35 on 13 June 1992. They were also recorded in the newly planted woodlands along the line of the old Russia Dock from 1988; in both sites they are now 'standard species'. Up to four were seen on the Mudchute in 1991, but not in 1992. Singles have been recorded from four widely separated local nature gardens, some of which appear to hold suitable breeding habitat. These observations fit in with the general pattern in London of a 'recent tremendous spread' (Plant 1987), to which 'urbanization appears to be little obstacle'.

Wall brown *Lasiommata megera*
Status: still widespread, but uncommon and decreasing.

In contrast to the speckled wood, wall browns have undoubtedly declined, with the destruction of their favoured hot, arid wasteland sites along the Thames, and habitat succession in others such as the Stave Hill Ecological Park. They were abundant at Stave Hill in 1988–9, with a maximum count of over 100 on 25 July 1989, but much scarcer in 1990–2. They are still present, though uncommon, at Old Ford Lock, the Mudchute and the Essex Filter Beds, and a colony was located along Wapping High Street in 1992. The recent run of fine summers should have favoured this species — 'an insect which seems to love the sunshine' (Plant 1987) — but it seems prone to wide population fluctuations, such as recently documented in Hampshire (Barker and Williams 1992).

MEADOW BROWN *Maniola jurtina*

Status: still widespread and very common, but may have declined.

Like the wall brown, the meadow brown is an open-country butterfly and has probably suffered from habitat loss. However, its habitat requirements are more catholic and it is able to build up much denser populations, for instance over 800 were seen on the Mudchute on 28 July 1991. As a result, meadow browns can still be found on any rough open ground up to the edge of the City. 1991 was an outstanding year, not only in the East End, but also in Hampshire (Barker and Williams 1992); M. Oates (pers. comm.) suggests that the very wet spring increased larval survival by promoting exceptional grass growth.

GATEKEEPER *Pyronia tithonus*

Status: one tiny colony with scattered other records; may be colonizing.

Apart from a single male (possibly holding territory) in a school nature garden off Brady Street, E1, on 31 July 1989, none was seen from 1987 to 1990. In 1991–2, a tiny colony was located on 'old' waste ground at Wapping High Street, with a maximum count of four on 24 July 1992. There were single records from the Cemetery and the Mudchute in 1991, and two males were seen in the Cemetery in 1992. A colony was also discovered in the Essex Filter Beds in 1992, with 12 seen on 11 July. In recent years, gatekeepers have gradually been spreading down the Lea Valley (C. W. Plant pers. comm.), where there is plenty of apparently suitable habitat — and we may well have missed some colonies here — but it is extremely interesting that the first colony found should be at the furthest end of the borough from the 'green corridor' of the Lea Valley.

SMALL HEATH *Coenonympha pamphilus*

Status: rare and declining; one colony.

As predicted (Murdoch et al. 1987), the sole surviving colony is at Old Ford Lock. Over 30 were seen there in both seasons in 1987, but numbers have since declined, probably because a favoured area close to Wick Lane, E3, was developed in 1991. One seen on 12 June 1988 was the last record from the Surrey Docks colony; an abundance of apparently suitable habitat still existed in the Docks, but the core area for the colony, round the Canada Dock, was being built on. Singletons were seen on the Mudchute on 1 June 1990 (the only record from this site) and at Mill Meads on 1 June 1992. These depressing observations confirm this butterfly's striking inability, noted in 1984–6, to establish new colonies. Bully Point and the Essex Filter Beds, a short distance up the Lea Valley, hold healthy colonies which could provide individuals for future recolonization.

Systematic list of the dragonflies with comments on species

COMMON BLUE DAMSELFLY *Enallagma cyathigerum*

Status: a major decrease caused by habitat destruction.

The main colony was unfortunately destroyed by the 'landscaping' of the western bank of the Canada Dock in 1989; since then, there has been a drastic decrease in sightings from the whole study area, with the only recent records coming from the Lea Valley. There is a healthy colony in the Essex Filter beds, where over 30 were seen on 20 June 1992.

COMMON BLUE-TAILED DAMSELFLY *Ischnura elegans*

Status: common in suitable habitat; the main colony is protected.

Fortunately, the main colony of this damselfly is in the Lavender Pond Nature Park and so should be secure; over 30 were regularly counted throughout the study period. There is also a large population in the Essex Filter Beds and occasional records from elsewhere in the Lea Valley, particularly Old Ford Lock. The backwaters of the Lea may well hold other colonies of both species of damselfly, but access is often not possible. This species is relatively tolerant of water pollution (Brooks 1989).

SOUTHERN HAWKER *Aeshna cyanea*

Status: established in one area: irregular elsewhere.

Since the first records in 1988, southern hawkers have been regularly seen in the Russia Dock/Lavender Pond/Stave Hill area of the Surrey Docks, but only in ones and twos at any one time. Their strongly territorial habits and the limited area of suitable habitat are probably responsible for these low numbers; exuvial counts would give a better estimate of population size. This species favours secluded ponds surrounded by tall vegetation (Brooks 1989), a description which fits the Russia Dock ponds increasingly well. There were also two in the Cemetery and two at Old Ford Lock on 23 August 1992. The Essex Filter Beds hold a healthy population, with 15 on 21 September 1991 the highest count.

BROWN HAWKER *Aeshna grandis*

Status: no longer recorded from the Surrey Docks area; irregular elsewhere.

Individuals were seen in the Russia Dock area on several occasions in 1988–9 (as well as in 1986) but have not been recorded there since. According to Brooks (1989), brown hawkers prefer more-open habitats than southern hawkers, so they may have been shaded out as the woodlands have matured. However, the nearby Lavender Pond has almost no surrounding vegetation, so this does not fully explain their disappearance. One was seen in the Cemetery on 14 July 1989 and there is a small colony in the Essex Filter Beds (maximum count only three, on 21 August 1992).

MIGRANT HAWKER *Aeshna mixta*

Status: irregular migrant; appears to be colonizing the Essex Filter Beds.

Migrant hawkers were widespread in the autumn of 1992, when they were occasionally seen at Stave Hill Ecological Park, the Cemetery and Old Ford Lock. In the Essex Filter Beds, they were regularly recorded from 31 July to 5 October, peaking at over 30 on 29 September 1992. These were the only observations of this species from 1987 to 1992. According to Brooks (1989), it 'will readily colonize large ponds and lakes and breeds throughout the London Area'. The number of records from the Essex Beds indicate that it is breeding there now that the water levels are fairly stable.

EMPEROR *Anax imperator*

Status: one record from the study area; breeds in the Essex Filter Beds.

One of the highlights of the summer of 1991 was the appearance of two emperors in the Russia Dock area on 4 August, with up to six (including mating pairs and ovipositing females) in August in the Essex Filter Beds. Ones and twos were regularly seen in 1992 at the Essex Filter Beds, but not over the Russia Dock. Corbet has shown (Corbet et al. 1960) that 90 per cent of emerging adult emperors are two years old, so eggs laid in 1991 are unlikely to become adults until the spring of 1993. Brooks (1989) describes the emperor as 'widespread and, due to its powerful flight, is easily capable of colonizing inner city sites'.

BROAD-BODIED CHASER *Libellula depressa*

Status: one record only in 1987–92.

Three were seen holding territory round a small pond in Stave Hill Ecological Park on 31 May 1990. Unfortunately, the pond dried out that summer and they have not been seen there since. A possible colonist.

Black-tailed skimmer *Orthetrum cancellatum*
Status: may be colonizing the Essex Filter Beds.

The first record was of two males holding territory round a suitably shallow, gravel-lined pond in the Essex Filter Beds on 4 August 1991. In the summer of 1992, there were several observations from this site, with a maximum count of five on 29 July. This species is extending its range in the London Area (Brooks 1989), but, at present, there may be no suitable habitat in the study area itself.

Common darter *Sympetrum striolatum*
Status: common at the Essex Filter Beds, but now irregular in the study area.

The colony in the Canada Dock (Surrey Docks) was wiped out by the 'landscaping' of 1989, though adults were able to emerge while the destruction was in progress (Murdoch 1989). For several years the only records were from the colony in the Essex Filter Beds (maximum count 30 on 21 August 1992), but in the autumn of 1992, ones and twos were also seen in the Russia Dock area, Lavender Pond, the Cemetery and Old Ford Lock. Described by Brooks (1989) as 'common in London and is a frequent breeder in garden ponds', but garden ponds are probably very rare in the East End.

Orthopteran records

Four species of Orthoptera have been found so far in the study area. The field grasshopper *Chorthippus brunneus* is widespread and abundant; it favours the hot, dry derelict grasslands and has been able to colonize many tiny sites, widely separated from other suitable habitat, right up to the edge of the City. The meadow grasshopper *C. parallelus* and the lesser marsh grasshooper *C. albomarginatus* are much more local; they have been found so far at Old Ford Lock, the Russia Dock area of the Surrey Docks and the Cemetery (with its adjoining wasteland area, Bow Triangle). Where they are present, they are usually common. Roesel's bush-cricket *Metrioptera roeselii* is common at Old Ford Lock and the Essex Filter Beds, and a small colony still exists on an area of old derelict grassland 200 m north of the Canada Dock (Surrey Docks).

Discussion

These observations confirm our previous conclusions (Murdoch et al. 1987) that the East End, though it is an inner city area, supports a wide range of butterflies. Brimstones and speckled woods have become established since 1984–6, orange-tips and gatekeepers appear to be colonizing, and only small heaths and wall browns have undergone substantial declines. Twenty-one species of butterfly now breed in the East End (Table 2) and most of them are flourishing. The situation for dragonflies is less encouraging; suitable habitat is limited and one major site has been destroyed. Of the five species thought to be breeding in 1984–8 (Murdoch 1989), colonies of common darter and common blue damselfly have been lost and brown hawkers have not become established. All five species, as well as emperors, migrant hawkers and black-tailed skimmers, are believed to be breeding in the Essex Filter Beds. Four species of orthopteran have also been recorded.

What factors determine the status of the species we have studied? We suggest, as before (Murdoch et al. 1987), that the most important are the habitat requirements for larvae and the powers of colonization of adults. The weather plays a major short-term role in determining butterfly numbers, but often operates in subtler ways than are appreciated — for instance, the cold spring of 1991 was followed by an outstanding season for green-veined whites and meadow browns. The desirable way to monitor this key variable would be a regular transect on a site such as the Mudchute, which we would strongly recommend to anyone repeating this study.

TABLE 2. Changes in status of East End butterflies, 1984–1986 compared to 1987–1992*.

Species	**Change in status and possible cause**
Common/very common and widespread	
Small white	Unchanged
Meadow brown	Possible decrease from loss of wasteland habitat
Large white	Unchanged
Essex skipper	Possible decrease from loss of wasteland habitat
Large skipper	Increase, possibly linked to more suitable habitat
Common blue	Possible decrease from loss of wasteland habitat
Small tortoiseshell	Increase, possibly related to good weather conditions
*Comma	Increase, possibly related to good weather conditions
*Holly blue	Dramatic increase of unknown cause, possibly temporary
Scarce but still widespread	
Small skipper	Possible decrease from loss of wasteland habitat
Wall brown	Decrease from loss of wasteland habitat
Green-veined white	Probably unchanged
Red admiral	Unchanged
*Small copper	Increase, possibly related to good weather conditions
*Speckled wood	Dramatic increase due to habitat improvement
Rare	
Peacock	Unchanged
Painted lady	Unchanged
Small heath	Marked decline probably due to inability to colonize
Brimstone	Increase due to wider availability of larval foodplant
Gatekeeper	Increase and possible colonization, of unknown cause
Orange-tip	Increase due to wider availability of larval foodplant
[Clouded yellow	Not recorded in 1984–6; irregular migrant]

*No semiquantitative assessment of abundance was attempted in 1987–92, so species are listed in the order of the equivalent table from 1984–6. However, the four species asterisked have increased enough to be placed in a higher category.

Habitat requirements: loss and creation

The situation in the East End is similar to that in most of south-east England: the neglected marginal land which has often, passively, become of wildlife value, has been whittled away by the intensification of land use, but nature conservation has been actively encouraged in much smaller, intensively managed areas, represented in the East End by the Cemetery, the Mudchute, the Russia Dock complex and the local nature gardens. We noted that the few remaining old, open wasteland sites, such as at Wapping High Street and a canalside site off the Commercial Road, are often remarkably rich in species. These sites need some disturbance to maintain the vegetational succession which encourages species such as wall browns and common blues, otherwise they just develop into impenetrable buddleia thickets!

Several of the nine butterflies most often found on waste ground may have decreased; the wall brown and the small heath definitely and, more questionably, the meadow brown, common blue and the two *Thymelicus* skippers — several of these species are so common that minor declines would be difficult to detect. The very local distribution of the small heath has made us wonder if there is some unknown, but major, factor restricting its spread; surprisingly little seems to be known about this insect (Heath et al. 1984). Recent work in Hampshire strongly suggests the importance of sheep's fescue *Festuca ovina* as a larval foodplant, and, to a lesser extent, *F. rubra* and *F. filiformis* (Thomas and Lewington 1991, Oates and Pope in prep.). But large skippers have increased, probably because they like the denser vegetation which many of the remaining sites are developing. Small coppers have also done well, perhaps because of the recent fine summers; but, as Plant (1987) comments, this species is subject to fluctuations which are not fully understood. Gatekeepers also breed on grasses, but they prefer bushier vegetation than other browns. There seems to be plenty of suitable habitat for them, particularly in the lower Lea Valley. The adults do, however, like to nectar on bramble *Rubus fruticosus,* which, as we noted before (Murdoch et al. 1987), has usually finished flowering in the East End before they are flying.

The three larger whites and the five nymphalids have all maintained their numbers or better, because their foodplants, Cruciferae and nettles respectively, are ubiquitous and because they are highly mobile; Plant's comment (1987) of small tortoiseshells, that they 'do not form distinct colonies, but have a more dispersive habit', applies to all except perhaps the green-veined white. They are therefore well able to cope with the transience of many East End sites and to make use of their opportunities.

The most exciting changes have involved the species associated with woodland edges, that is, holly blues, brimstones, orange-tips and speckled woods, all of which have done spectacularly well. Holly blues may well be a case apart, as a major population regulator appears to be the local status of the parasitic ichneumonid wasp *Listrodomus nycthemerus.* The others have benefited from a sequence of fine summers, but both general conservation-oriented management to diversify the habitat and more specific measures directed at individual species have contributed. The most remarkable change has been to the Cemetery, which is becoming an excellent example of what urban nature conservation can achieve. At least 15 species of butterfly now breed regularly, many in good numbers, and it is the stronghold in the study area for the four woodland species mentioned above. The Russia Dock area also has a fair variety of butterflies, notably speckled woods and wall browns, but much of it is assiduously mown and much less interesting than it could be. Local nature gardens are often only recently established and will probably become increasingly valuable; one of the longer established (1980), St Jude's Nature Park in Bethnal Green, has boasted breeding brimstones, orange-tips and small coppers, as well as common species such as large skippers and holly blues. These wildlife oases are perhaps the most exciting development in the East End; from them we have recorded 19 species of butterfly, most of which could or do breed.

The more specific measure, the provision of larval foodplants for brimstones and orange-tips, should be considered as a practical experiment in ecology. There seems to have been no buckthorn in the study area until a few bushes were planted in the Cemetery by TJL in 1980–1. In 1985–6, brimstone eggs were found on four occasions, always on recently planted buckthorn bushes. Continued and more widespread planting has been rewarded by many records of eggs and larvae in 1991–2, strongly suggesting that it was the absence of larval foodplant rather than the inner city environment which was the limiting factor (*con.* Plant 1987). Garlic mustard, the foodplant of the orange-tip, has long been present in small quantities in sites such as the Cemetery, but recently it has been specifically planted in local nature gardens. In 1992, undoubtedly encouraged by the beautiful spring, both species appeared in record numbers in the Cemetery and were recorded breeding in five local nature gardens scattered throughout the East End.

East End dragonfly habitats are much more limited, particularly after the 'improvement' of the western bank of the Canada Dock in 1989. This site held common blue damselflies, common darters, small heaths, wall browns and, sometimes, breeding tufted ducks *Aythya fuligula,* until it was 'landscaped', theoretically to improve its value for wildlife. Unfortunately, the topsoil was removed and very little now grows there; three years on, the bricks and lumps of concrete which form much of the 'soil' are all too obvious. This area is an expensive, ugly disaster. In contrast, the Russia Dock ponds, created in the mid-1980s, are a visionary success and have attracted a remarkable variety of wildlife — not only dragonflies and butterflies, but large numbers of common toads *Bufo bufo,* and birds such as redpolls *Acanthis flammea* and blackcaps *Sylvia atricapilla* now breed in the area. They are now probably too shady for most dragonflies, but the nearby Lavender Pond, which is much more open, should provide the necessary diversity — it is disappointing that after nearly 10 years, these ponds appear not to hold more odonate species than southern hawker and blue-tailed damselfly.

When the Essex/Middlesex Filter Beds were shut down in the early 1980s, their wildlife value rapidly increased. In 1985, a common emerald damselfly *Lestes sponsa* was seen ovipositing in one of the Middlesex Beds (S. Brooks pers. comm.). Unfortunately, in the late 1980s, the water-levels were allowed to fluctuate widely and several of the Middlesex Beds became overgrown, losing much of their interest. Three of the Middlesex Beds are still overrun by scrub and shaded out by willows. The area is now actively managed and the water-levels controlled; we hope that this outstanding site will realize its full potential. It also holds healthy populations of many butterflies, notably orange-tips, small heaths and, recently, gatekeepers, as well as a flourishing colony of Roesel's bush-cricket.

The new dragonfly habitats worth watching will be in the local nature gardens. Many of them have been provided with tiny ponds for educational activities such as fishing for 'minibeasts'; and we have seen enough dragonflies, particularly the two damselflies, on wasteland sites far from water (Murdoch 1989), to be certain that they will find these ponds. Potential breeding species include blue-tailed damselfly, common darter, broad-bodied chaser, brown and souther hawkers, and possibly the emperor (Brooks 1989).

Dispersal and colonization

Mobility is obviously of great importance in the East End environment (Murdoch et al. 1987); certain groups, notably the whites and the nymphalids, are strong fliers and are able to find nectar sources, and often larval food plants, far into completely built-up areas. They tend less to form discrete colonies than do the skippers and some of the browns, particularly the small heath, so the rapid habitat turnover characteristic of the East End affects them less.

Though several of the open-ground species have or may have declined, it is striking that most of them — common blues, the skippers, meadow and wall browns — can still be expected with some confidence when another wasteland site is discovered. The recent success of so many butterflies — though surely influenced by four seasons of fine weather — suggests to us a more fundamental change. We suggest that the gravid females in a population of butterflies can be crudely classed as 'stayers' or 'goers'. 'Stayers' tend not to move far and to lay their eggs locally, and will normally account for the great majority of the population. 'Goers' wander; under normal circumstances, they suffer higher mortality from predators (and nowadays insecticides), and lay fewer eggs, but they may found new colonies. The proportion of 'goers' increases in 'periods of expansion' linked to hot summers — for instance, 1989–2 — but decreases drastically in 'periods of low mobility' such as in the cooler years 1985–8. However, the ephemeral nature of many sites in the East End, derelict land especially, might favour a higher proportion of 'goers', particularly as the negative effects of predators and insecticides will be much less in the inner city. The selection of 'goers' rather than 'stayers' would explain the ability of supposedly sedentary species such as the skippers to colonize suitable but distant sites so rapidly. It would explain the recent range expansion of gatekeepers if a population with a high proportion of 'goers' has recently appeared. It would suggest that East End butterfly populations would be expected to become yet more mobile, forming less distinct colonies — and so more difficult to census! — but better adapted to the inner city environment. If a way could be found to quantify the moving urge of gravid females, as has been done with migrant warblers, notably the blackcap (Berthold et al. 1992), comparisons of, say, large skippers from the countryside and the East End could be used to test this idea.

There is no question that many dragonflies have excellent powers of dispersal (Corbet et al. 1960), and previous observations (Brooks 1989, Murdoch 1989) show clearly that all of the species regularly recorded in the East End are widely distributed throughout inner London. In August 1992, the variety of odonates found in sites such as the Cemetery, well away from breeding habitat, suggests that this may have been an invasion year, a phenomenon well known to Corbet. However, at least two damselflies, the large red *Pyrrhosoma nymphula* and the azure *Coenagrion puella,* have distributions similar to the former range of the gatekeeper: they are abundant in the countryside, but do not penetrate far into London (Brooks 1989). Brooks notes that the azure damselfly is rarely found away from water, and suggests that this prevents it from dispersing to suitable ponds in inner London; the large red damselfly, one of the most adaptable British odonates, is found in London principally in acidic ponds on heathland sites. This habitat restriction is surprising and deserves further study.

We are highly sceptical of the importance of 'green corridors' as routes for butterflies and dragonflies to penetrate inner cities (Baines 1986). Certainly, the Lea Valley provides valuable sanctuaries in which, for instance, colonies of small heaths can survive, but this is distinct from the need for a 'flyway'. The brimstones and orange-tips which initially colonized the Cemetery must have flown several miles (Epping Forest was the nearest known breeding area for the brimstone (Plant 1987)), mostly through heavily built-up areas. The weight of nine years' data from the East End and many observations brought together by Plant (1987) and Brooks (1989) show clearly that many species of butterflies and dragonflies — though, it seems, not all — can penetrate inner urban areas and colonize suitable habitat. This has major implications for urban nature conservation.

Orthoptera in the East End

For the Orthoptera, we advance our records with some trepidation, more in the hope that we will stimulate other observers to add to the four species we have found. Marshall and Haes (1988) suggest several species which might be expected, for instance dark bush-cricket *Pholidoptera griseoaptera* and speckled bush-cricket *Leptophyes punctatissima,* which could well be present in the Cemetery or the lower Lea Valley. Speckled bush-crickets have been found just to the north of the study area on the east bank of the River Lea (D. Martin pers. comm.).

Some orthopterans have established healthy colonies far into the inner urban zone. Dry, hot scraps of wasteland such as at Cavell Street, E1, often seethe with field grasshoppers, which, as these sites are far from 'green corridors', must have originally reached them by flying through built-up areas. It is hard to believe that meadow and lesser marsh grasshoppers, similar species to the field grasshopper, cannot disperse by the same means; all three have penetrated as far as the Stave Hill area of the Surrey Docks, two miles from the City of London. The female meadow grasshopper is usually unable to fly, but the proportion of macropterous (full-winged) individuals (form *explicatus*) increases in response to overcrowding (Marshall and Haes 1988). Likewise, macropterous examples of Roesel's bush-cricket (form *diluta*) appear in hot summers when colonies are thriving (M. Oates pers. comm.). These must be mechanisms for dispersal by flight in favourable conditions. It is likely that the limiting factor for these species in the East End is habitat availability rather than their powers of colonization. We suggest that several species of orthopterans, as well as butterflies and dragonflies, can be expected anywhere in London if enough suitable habitat is available for them.

Conservation proposals

To our considerable surprise, the East End is at present richer in butterflies than it was when we surveyed it in 1984–6. Sympathetic management of the Cemetery, the maturation of the Russia Dock area and the development of local nature gardens have considerably diversified the habitats available. However, there is still great scope for improvement, particularly for the open-ground species. The Northern Outfall Sewer running through Old Ford Lock is easily taken for granted — it cannot be redeveloped — but it needs active management of the rank grass on its sides and control of invasive species such as Japanese knotweed *Polygonum cuspidatum*. To its north lies the Old Ford Pumping Station site, a small triangle of rough grass, fringed by trees, much of which has become very overgrown. This site and the adjoining land could be redeveloped, and more active management would not only benefit the area's wildlife, but greatly strengthen the case for its preservation. We are saddened by the recent destruction of all vegetation over a large part of Mill Meads, an area of considerable recreational and wildlife value; we hope that Thames Water Authority will take the opportunity to improve the area's conservation interest once works are completed. A major contribution to butterfly populations would be made if parts of such large formal parks as Victoria Park and Mile End Park were managed for nature conservation; the Russia Dock is an outstanding example of what can be achieved.

It is relatively easy to improve ponds for dragonflies; they should be well stocked with aquatic plants and fringed by vegetation that allows adults to lay eggs and to emerge from the water. They should not be too shaded or too shallow — two concrete-bottomed ponds in the Stave Hill Ecological Park dry out in the summer! Excellent and enthusiastic suggestions can be found in Baines (1986) and *Pond construction for dragonflies* (available from the British Dragonfly Society). The western bank of the Canada Dock is slowly revegetating, but it needs encouragement; it would be little work to remove the industrial debris and plant species such as sedges *Carex* spp., rushes *Juncus* spp., flag iris and reeds, which would improve both its appearance and its value for wildlife.

Most of all, we hope that more people from the East End become aware of the wildlife around them — which is why we welcome the local nature gardens so much. We note that very few secondary schools yet have nature gardens — they might be very useful for biological studies. If enough Eastenders care about their local wildlife (and there is enough now to be worth the interest), threatened sites are much more likely to be saved and there will be greater pressure to conserve and improve sites such as Stave Hill Ecological Park and Old Ford Lock. Again, the management of the Cemetery leads the way; they have recently begun guided nature walks.

The future for East End wildlife

Many of our predictions from our previous survey have come true, and it is important for the future management of East End wildlife to try to assess what will happen next. Sixty years ago, the East End was a more densely populated and heavily polluted environment than it is now, and the variety of wildlife must have been much more limited. The impact of the Blitz and the Clean Air Acts has allowed wildlife to move back in, a process which is still going on, as we have documented over the last nine years. What might happen next?

Inspection of the butterfly distribution maps in Plant (1987) is not encouraging; there are no potential colonists within five miles. However, the habitat is present, for instance for green hairstreaks at Old Ford Lock or for ringlets in the Cemetery. The recent and dramatic spread of gatekeepers, from being 'almost absent from London' (Heath et al. 1984) to Wapping High Street, 400 yards from the City, shows that the unexpected should be expected. More likely is the failure of brimstones, orange-tips or gatekeepers to become established — the brimstone records of 1985–7 suggest that this has happened before. The potential for dragonflies to colonize is greater; not only are they highly dispersive, but relatively little has been done to encourage them so far. Potential colonists include the broad-bodied chaser and the ruddy darter *Sympetrum sanguineum* which 'will even colonize newly created ponds in inner districts' (Brooks 1989). However, it is unlikely that these ponds could maintain viable odonate populations in the longer term, or that the local nature gardens, however well managed, could support permanent populations of many butterflies. We expect to see a scattering of major sites — the Cemetery, the Mudchute, the Russia Dock area and the lower Lea Valley — holding substantial colonies of species such as small coppers and brimstones, which in good seasons spread out to smaller sites: a few 'permanent populations' surrounded by short-term 'satellites'. Sympathetic management of the major sites is therefore essential. How much derelict land there will continue to be is a difficult question, and a very important one. But even if the great majority of the wastelands are redeveloped, there is still enormous potential for the municipal parks to be more sympathetically managed.

So far, our surveys have been descriptive rather than analytical; we have not attempted to answer more basic questions about the ecology of the groups we have studied. We suggest that the East End offers excellent opportunities for investigating mobility and dispersal; the limited habitat available would make mark/recapture experiments relatively simpler than in the countryside. We would like to encourage longitudinal studies of colonization of ponds and new nature gardens; investigations into the habitat requirements of small heaths and *Thymelicus* skippers; and surveys of the remaining wasteland sites, the most characteristic of the East End's wildlife habitats. Secondary school and university students and amateur naturalists can all make significant research contributions. We are aware that East End wildlife will never be important on a national scale; but the insect groups we have described are ever exciting, they are so much more resilient and adaptable than we expected. Inner city wildlife is fascinating; we hope that it will be given the attention it richly deserves.

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Spiders and disturbance on Hampstead Heath and some other London grasslands

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Summary

Pitfall-trap studies of Hampstead Heath have revealed a highly disturbed and rather impoverished spider fauna, dominated in most parts of the public areas by pioneer or 'weed' species common on garden lawns, but usually absent or very scarce on semi-natural grassland. In the protected area of grassland in the Bird Sanctuary a much more diverse and natural fauna was found. Some rare species were found in one area of the South Heath, including the *Red Data Book* species *Tapinocyboides pygmaeus* and the Nationally Notable *Lepthyphantes insignis.*

Some management implications are discussed, in particular some suggested modifications to the mowing regime to allow less uniformity, and selective reduction of disturbance of all types in certain areas, in particular on South Heath and in the damper areas elsewhere.

Finally, a complete list of the pitfall records from 12-month trapping at sites on Hampstead Heath, in semi-natural acid grassland at Barnes Common, on a domestic lawn in Crouch End, and three grassland sites at Alexandra Park are given, together with an up-to-date list of other spider species recorded from Hampstead Heath.

Introduction

Studies of spiders at sites in London conducted over periods of at least a year have been reported for woodland and grassland at Alexandra Park (Milner 1987*a*), for woodland and a marshy area bordering a pond at Oxleas Wood (Milner 1988), and for woodland including some grassy clearings at Queen's Wood (Milner 1990). Quantitative data have been obtained in each case from similar trios of standard pitfall-traps in different habitats at each locality.

Some of the data obtained suggested that disturbance was a major factor influencing the fauna in some of these sites, the presence of large numbers of several pioneer or 'weed' species in Queen's Wood contrasting with their almost complete absence from the much less disturbed and ancient woodland at Oxleas Wood.

With these observations in mind the writer has subsequently undertaken similar pitfall-trapping in grassland habitats over 12-month periods at a number of localities in the London Area, in particular several grassland sites on

Hampstead Heath on behalf of the Corporation of London who are in the process of drawing up a management plan for the area.

Hampstead Heath

Hampstead Heath is well-known to members of the LNHS as an extensive area of mainly grassland, oak woodland and scrub in north London, which has been a public open space for more than a hundred years. Before that much of what is now the Heath was scarred by sand and gravel workings, which were infilled and the areas replanted with trees and (presumably) reseeded with grass.

It has been a popular recreational area since then, and the vegetation has suffered heavy trampling, disturbance and eutrophication for many decades; as early as 1913 it was 'remarkable how the characteristic (grass-heath) vegetation persists, in spite of the enormous traffic on the Heath' (Tansley, in Hampstead Scientific Society (1913)). In more recent times a comprehensive mowing regime has been in place for some while. Today the entire area, including Parliament Hill, Kenwood, East and West Heath, and the Hampstead Heath Extension, covering a total of over 800 acres, is open to the public (the study reported here refers to East Heath only).

Records of the flora indicate that in former times the Heath was to some extent a genuine heath 'with abundant bell-heather *Erica cinerea* and cross-leaved heath *E. tetralix,* bilberry *Vaccinium myrtillus* and juniper *Juniperus communis',* according to Fitter (1945). These gradually disappeared until by 1912 they were all either absent or represented by a few individuals or small patches (various authors quoted by Kent (1975)). Today these plants are gone or are extremely scarce on the Heath. *Calluna vulgaris* was thought to be extinct on the Heath since 1942 (Burton 1983), but has recently been found again by the writer and others in one part of West Heath, and a small patch of *V. myrtillus* was last seen on West Heath in 1991 (Ray Softly pers. comm.) although until then had been thought to be extinct since 1967 (Burton op. cit.). The rest of the flora is also thought to have been considerably impoverished over the last century, and at the same time the area has been invaded by a number of weeds and aliens from surrounding areas including gardens.

In general the changing pattern of the fauna on the Heath has not been particularly well documented although Ray Softly (1992) has investigated the Lepidoptera for many years and has shown that many species recorded in the last century have been lost while over 50 new species have been recorded in recent years.

The only report made specifically on the spiders of the Heath was by Russell-Smith (1978) at a time when the spider fauna of London was not very well known. At that time he listed a total of 92 species recorded from all habitats on the Heath, 84 collected by him of which 30 were new records for the county of London (the old LCC area). However as W. S. Bristowe (in Russell-Smith 1978) commented at the time, several spectacular species which had been recorded at earlier times from the Heath, notably *Atypus affinis, Micrommata virescens, Diaea dorsata, Araneus marmoreus* and *Pisaura mirabilis,* were not found by Russell-Smith. It was assumed that they had become extinct on the Heath. In the course of the present study, some specimens of *P. mirabilis* were taken in pitfall-traps at several sites, but the other species mentioned by Bristowe were not seen, and indeed have not been recorded from the Heath in recent years. Some new species have been recorded, a few of which were presumably overlooked before including two pioneer species *Milleriana inerrans,* and *Porrhomma microphthalmum* which may have colonized the disturbed Heath in recent times.

Materials and methods

In most parts of the Heath that were to be studied (following consultation with the superintendent) preliminary sweep-netting produced no spiders at all. Only at Site 02 was there sufficient structural diversity of the vegetation to make this method worthwhile, so occasionally this method was used there and on the few gorse bushes on South Meadow. The main study used pitfall-traps.

While pitfalls do not sample the entire fauna they do sample the activity of spiders at ground level with minimal effects on the habitat; other methods of study such as sweep-netting, D-vac suction sampling and so on can sample other fractions of the fauna, but are less easy to standardize, or have drawbacks of one sort or another. Pitfalls are particularly effective at sampling habitats of low structural diversity, but in any case this study was not aimed at assessing the entire fauna, but producing results that could be compared with other similar studies.

The standard trios of pitfall-traps as described by Milner (1987) have been employed. Where possible the traps were covered by small zinc roofs to keep out the rain, though this was not possible in the shortest grass sites, where they might have attracted unnecessary attention, although occasionally such traps filled with water. In wet weather some sites were also prone to waterlogging rendering the traps ineffective.

Trapping sites on Hampstead Heath (Figure 1)

These were chosen to give a range of different conditions in the grassland habitats within the area managed by the Corporation of London on the main part of Hampstead Heath (i.e. excluding West Heath, Kenwood and the Hampstead Heath Extension). The missing numbers refer to sites that were abandoned for various reasons after trapping had started.

Site 02. In a damp, unmown, but heavily trampled area in the meadow west of the Ladies' Swimming Club. This is one of the very few places where grassland with complete public access is left unmown, giving a high level of structural diversity. The vegetation is dominated by large clumps of *Juncus effusus* and *Carex* spp., with patches of *Holcus lanatus* and various herbs such as thistles *Cirsium vulgare* and *C. palustris,* rose-bay willow-herb *Epilobium hirsutum,* dock *Rumex obtusifolium,* and yellow flag *Iris pseudacorus.* Waterlogged at times in the winter.

A high level of disturbance was indicated by the frequency with which the trap-roofs were found to be damaged or flattened; well-chewed sticks were also frequently found, suggesting that dog owners encourage their animals to chase through the area.

Site 03. Inside the Bird Sanctuary enclosure, a relatively dry area of unmown grass with some anthills, mainly *Agrostis stolonifera,* with some male fern, mosses, willow-herbs and red campion. It is an area with some anthills, suggesting that it has rarely been mown. The Bird Sanctuary is enclosed in a five-foot high cast-iron fence discouraging, but not preventing, access by the general public and dogs. Occasional disturbance was detected by finding flattened roofs. During the course of the study a heavy mower was driven over part of the area once destroying the trap-roofs completely.

Site 04. About one metre into the reed-bed dominated by *Phragmites communis* and *Glyceria maxima,* inside the Bird Sanctuary. Not strictly grassland in the normal sense, the site was waterlogged for much of the winter (adversely affecting the efficiency of the traps), but it is structurally diverse and normally undisturbed. Like the previous site however, it was machine-mown once during the course of the study period damaging the trap-roofs.

Site 05. In the small meadow between South Wood and the Stock Pond which I have called Lower Cohen's Field, an area that had been sown as a flower meadow some years ago and then subsequently resown. In the slightly damper part of the meadow where there are clumps of *Juncus effusus,* and some *Carex*

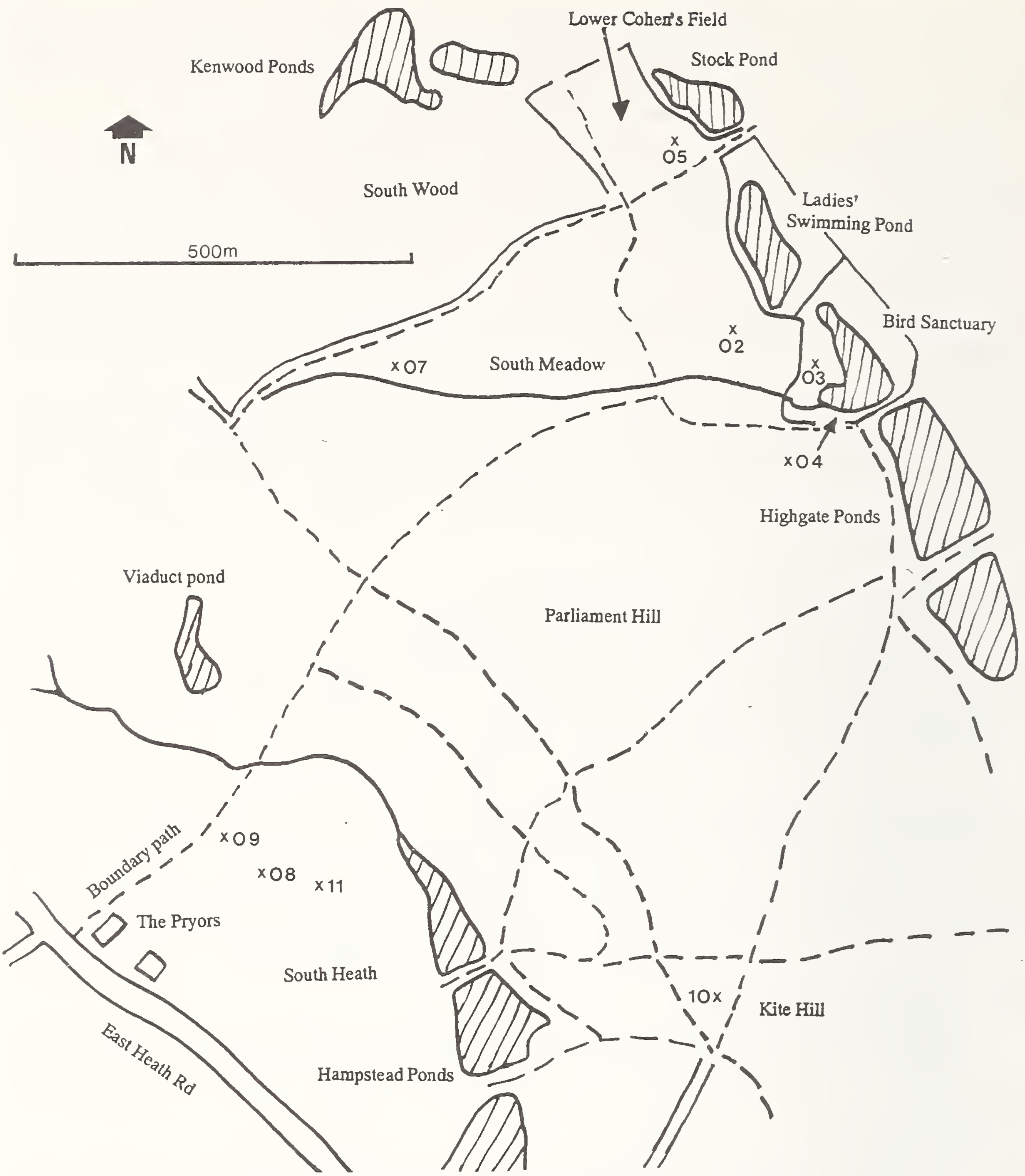

FIG. 1. Part of Hampstead Heath showing trap sites.

ovalis in a sward of *Festuca rubra* and *Agrostis* sp., with some clumps of *Ranunculus repens*. The whole meadow is regularly mown. This site is also fairly well trampled, though not as much as some other parts of the Heath.

SITE 07. In a very damp area, mainly *Ranunculus repens* and *Agrostis stolonifera* next to a small and sluggish stream (much impeded by dead leaves), on the west side of South Meadow. The site is partly shaded by mature oaks, and was waterlogged for some of winter and spring. It is also frequently mown and also trampled by people and dogs; the traps were sometimes vandalized and the roofs thrown about or flattened.

SITE 08. In a dry, rather sandy area on South Heath, below the Pryors (a block of flats) in an area dominated by finer grasses such as *Festuca rubra* and *Agrostis tenuis,* but with some *Juncus effusus* and nearby some extensive patches of *H. lanatus* and *Dactylus glomeratus,* and some rye-grass *Lolium* sp. The area is regularly mown and heavily trampled. The grass is kept short most of the year, and there are some bare patches of sandy or gravelly ground. At this site the trap-roofs were not used as it was thought they could attract attention. Small squares of plastic netting were used to keep leaves out of the traps.

Site 09. On South Heath near Site 08 at the edge of the secondary oak/birch woodland. The site is partly shaded by the young trees and the vegetation is mainly *Festuca* spp. and *Agrostis* spp. with some bramble *Rubus fruticosa* and young gorse *Ulex europaeus*. The area was apparently burnt some years ago, so the plant community is rather immature, but it is structurally diverse, undisturbed and unmown.

Site 10. In a fairly dense grassy sward of *Festuca rubra* and *A. stolonifera,* with nearby patches of *H. lanatus* and *D. glomerata,* on the south-west slope of Kite Hill. Well drained, regularly mown and fairly heavily trampled.

Site 11. In a damp area near the middle of South Heath, probably the site of an old pond near some willows. The area is dominated by *Glyceria maxima* and *Agrostis stolonifera* near a mature willow in one of the damper parts of South Heath, in what appears to be the site of an old pond. Mown before the study period, but not during it, and fairly heavily trampled with the roofs frequently flattened.

Other grassland sites

In addition to the Hampstead Heath traps, two other grassland sites (at Barnes Common and a lawn in Crouch End) were trapped and the catches are reported here. Finally some data from an earlier study of three grassland sites at Alexandra Park have been reassessed for comparison.

1. Barnes Common

'OPEN' Site. This site was in undisturbed and unmown dry acid grassland dominated by *Festuca* spp. and *Rumex acetosella* with numerous anthills and a very uneven surface.

2. Crouch End

'LAWN' Site. This site was the centre of a small, but long-established domestic lawn in a back garden in Crouch End. Intermediate in moisture level, but clearly very heavily trampled and frequently mown, the commonest species present are *Lolium perenne* and *Poa annua,* with a good deal of white clover *Trifolium repens.*

3. Alexandra Park

'HEATH' Site. This site was on a south-east-facing slope in one of the mown but least-trampled parts of Alexandra Park. The grass sward is dense and diverse with several species of grass being present, in particular *Festuca rubra, Trisetum flavescens* and *Agrostis stolonifera,* with some patches of *H. lanatus* and *D. glomerata.* Low levels of disturbance with traps rarely affected and trap-roofs scarcely ever flattened.

'TUSSOCK' Site. This is a long-grass area, unmown and reaching at least 1 metre high in summer when it is somewhat trampled. In winter it is frequently waterlogged, causing problems for pitfall-trapping. There are several large tussocks of *Deschampsia caespitosa,* and the other grasses present are *Arrhenatherum elatius, Alopecurus pratensis* and *Poa pratensis* as well as all the species occurring at the 'Heath' Site. Within about two metres of a path, but almost completely undisturbed, roofs never flattened.

'OAK' Site. This is a more open plant community than either of the other sites, south-facing, but partly shaded by some mature oak trees dotted about. Several of the grasses present in the 'Heath' Site are present, as well as sheep's sorrel *R. acetosella,* but the sward is sparse with some bare ground between, though it is mown and somewhat trampled. Traps were occasionally vandalized at this site.

Trapping period

The traps in each case were used for a period of 12 months with the following starting dates: Hampstead Heath, 10 May 1991; Barnes Common, 6 February 1990; Crouch End 'Lawn', 17 November 1986; Alexandra Park 'Heath' and 'Tussock', 1 July 1985; 'Oak', 7 September 1985.

Results

The 27 traps (nine sites) at Hampstead Heath produced a total of 5,126 spiders of 83 species, of which 55 species (66 per cent) were Linyphiidae. Some were new records for the Heath and even for London county.

The basic data from the individual sites both at Hampstead Heath and the other localities are given in Table 1. The 12-month catch for the trios of traps at Hampstead Heath varied from just 185 individuals (31 spp.) from Site 09, to 995 (29 spp.) at Site 10, one of the most disturbed sites. Totals were generally higher at the more-disturbed sites in spite of actual disturbance of or damage to individual traps at those sites which must have somewhat depressed the figures. However even higher totals were recorded at two of the sites at Alexandra Park, one of which was much less disturbed than the Hampstead Heath sites.

If the two marginal sites (04 marsh and 09 woodland fringe) are ignored, the least-disturbed site at Hampstead Heath (03) had by far the highest number of species at 43. This was 34 per cent more than the next most diverse of the other sites at 32 species (Site 11). The only other site with a similar diversity was at Barnes Common (44); even the sites at Alexandra Park were much less diverse.

If the damper sites are compared with the drier sites the mean abundance is lower, but this is probably explained by the reductions in the catch at the damper sites by the intermittent waterlogging. However if the estimated level of disturbance is used to separate sites, as in Table 1, there are striking differences in diversity which can be seen in Table 2, and these figures are similar when the sites from the other three localities are included. What they suggest is that diversity is considerably depressed by disturbance to almost half the level at the undisturbed sites.

Results from pitfall-trapping in London woodlands has suggested that increased disturbance does result in higher numbers of individuals (Milner 1990), but no clear difference of diversity. Here in grassland it appears that while disturbance does result in somewhat higher numbers of spiders there is also a reduction in diversity.

Unusual species

Among the species trapped were several unusual species some of which are rare nationally. Perhaps the most spectacular find was the *Red Data Book* Category 3 species *Tapinocyboides pygmaeus,* a very pale money-spider (Linyphiidae) of which three males were taken at Site 08. Two specimens of *Lepthyphantes insignis,* a Nationally Notable B species, were taken at Site 08, *Porrhomma campbelli* was taken at the damp Site 07, the only previous London record being from the marshy area near Site 02 (Milner 1978). *Panamomops sulcifrons,* the tiny horned spider, was taken at Site 03, *Porrhomma microphthalmum* was taken at Site 11, and another tiny pale species, *Tapinocyba praecox,* was taken at Sites 07 and 10. A total of 22 adults of a large and spectacular wolf spider *Alopecosa cuneata* was taken at Site 08; remarkably these are the first records for this species in either London of Midddlesex counties.

Common species

The other species recorded were all common or very common, well known from other sites in the London Area. Numbers of typical grassland species, especially lycosids such as *Pardosa* spp., *Trochosa* spp. and the common tetragnathid *Pachygnatha degeeri,* were mostly much lower than expected. However, this was more than compensated for by the high numbers of several species which are the ubiquitous 'weed' species that characteristically are the first to colonize new habitats or make up the main part of the fauna of very disturbed urban habitats. These are what Dr Eric Duffey has referred to as the 'recreation ground species', such as *Erigone dentipalpis, E. atra, Oedothorax fuscus* and *O. retusus.* Table 3a lists the totals of the ten most abundant species for the Heath as a whole; most of them are these 'weeds'. Table 1 gives the diversity at 50 per cent and 75 per cent of the catch, and then the X score (the proportion of the total catch made up of the commonest seven 'weeds').

This last figure is perhaps the most striking. Unfortunately the levels of disturbance are only rather crude estimates based on the frequency of damage to trap roofs, together with the apparent frequency of mowing, but the coincidence of low X figures with low levels of disturbance and high X figures with high levels of disturbance is spectacular, especially when the reduction of total diversity is taken into account. The result is that in some of the more disturbed sites these 'weed' species make up the majority of all spiders trapped (Table 3a) apparently replacing the grassland species that can still be found in such habitats which are or have been undisturbed over certain periods. Several of these 'weeds' are very scarce or completely absent from the least disturbed sites.

For example at Site 03 (relatively undisturbed), most of the seven weed species were represented by very small numbers of individuals; Table 3b shows the figures for these species at the other localities and a similar pattern emerges although there are one or two anomalies. The disturbed sites are characterized by large numbers of the 'weed' species, especially *Oedothorax fuscus* and *Erigone* spp., and the scarcity or absence of the common grassland species such as *Pardosa* spp., *Pachygnatha degeeri,* etc. Similar figures emerge from the catches at the other localities although the extraordinarily high total for *E. dentipalpis* at the Oak Site in Alexandra Park is a puzzle, as are the low figures for *Oedothorax* spp., at the same site. There are however many other factors affecting the spider fauna in these grassland sites, but the influence of disturbance appears to be a major one.

The spiders trapped at Site 03, inside the Bird Sanctuary were rather different from those elsewhere (Table 4), and while the rarities found at Site 08 were absent several other grassland species were found there and not at any of the other Hampstead Heath sites, for example two species associated with ants, *Micaria pulicaria* and *Phrurolithus festivus,* and the jumping spider *Euophrys frontalis.* Two other grassland species that are much less common in disturbed places, *Pocadicnemis juncea* and *Micrargus herbigradus,* both occurred at 03 in much larger numbers than elsewhere. However, the high score for *Diplostyla concolor* seems to be anomalous; it is generally a common spider of disturbed places that are also shaded.

Sweep-net catches at Hampstead Heath

Three species were captured by sweep-netting that did not occur in the trap catches: a single rather small female of the large orb-spinner *Araneus quadratus* was taken from the thistles near Site 02 (only the second known site for this species in London county); several specimens of the smaller bright green orb-spinner *Araniella cucurbitina* and a female crab-spider *Philodromus aureolus* were taken from the gorse bushes on the South Meadow. A single individual of *Araneus diadematus* was taken in a trap at Site 11 in the course of the pitfall-trapping, and *Gibbaranea gibbosa* was recorded from the Heath by Russell-Smith (op. cit.). Very few grassy parts of the Heath today have the structural diversity of vegetation which would be needed to support a large population of orb-spinning spiders, and they are therefore restricted to the scrub and woodland fringes.

Discussion

Although there is clearly quite a diverse spider fauna still thriving on the Heath (a total of 154 species has been recorded), some of the most attractive but sensitive species are almost certainly extinct, and the rest of the fauna is in some ways disappointing for such a large and long-established open space; those larger and more spectacular spiders that do still occur such as *Agelena labyrinthica* (which may now have disappeared), *Tetragnatha* spp., and even *Araneus* spp. are all scarce.

Summary of Hampstead Heath spider records (all habitats)

1. Species only recorded pre-1939	7
2. Species recorded up to 1957 (Savory and Le Gros), but not since:	10
3. Species recorded up to 1972 (Russell-Smith 1978), but not since:	15
4. Recent records (since 1984)	121
Total	153

The spider fauna of the Heath has not been comprehensively investigated, there being several habitats that have only cursorily been examined, in particular the marshy borders of the many ponds. However the total number of species recorded is higher than for any other site in London or Middlesex, and a number of very common species such as *Amaurobius ferox* and *Scotophaeus blackwalli* have not yet been recorded from the Heath although they are almost certain to be present.

However, in spite of the long species list, the results of this survey suggest that from a spider's viewpoint, much of Hampstead Heath today is more like a garden lawn than a stretch of semi-natural grassland such as parts of the less-disturbed open spaces in London like Barnes Common or even the remoter parts of Alexandra Park. The only site investigated that compares with those sites is inside the enclosure at the Bird Sanctuary, and there the apparent absence of the typical less-frequent grassland species, such as *Zelotes* spp. or *Agroeca* spp., is disappointing. (However it is possible that the Bird Sanctuary does contain some larger web-spinning spiders; further sweep-netting needs to be done there). Most of the other sites studied produced alarmingly pioneer-dominated spider catches which indicate most unnatural assemblages of spiders for such apparently long-established habitats.

In parts of South Heath at least there are apparently remnants of an interesting and diverse spider fauna which probably occurred much more widely in days gone by. Some of the larger and more spectacular species like *Atypus affinis* appear to have gone, but some, like *Pisaura mirabilis* and the newly recorded *Alopecosa cuneata,* are still to be found, though they were almost certainly more widespread formerly. Some of the smallest and rarest species are also apparently still surviving. *Tapinocyboides pygmaeus* is such a rare spider that little is known of its habits; it is only known from six other sites in the UK, while *Lepthyphantes insignis* is also rare nationally, but is frequent on the Breckland heaths (grass heaths) of East Anglia (Duffey pers. comm.). It must be assumed, partly from the apparently limited area in which they occur on the Heath, that these rare species are seriously threatened by the changing pattern of the Heath.

Disturbance

Disturbance is obviously a constant factor on the Heath. As a public open space in the midst of a great metropolis, it is intensively used by thousands of people every day, and trampling by dogs and people though variable is generally heavy. In addition most of the public areas are machine-mown with heavy tractor-driven mowers several times a year. Even part of the grassland in the Bird Sanctuary was mown once during the study period, damaging or destroying some of the anthills. There are in fact no completely undisturbed areas of grassland on the Heath.

Historically, much of the grassland on the Heath has been 'improved' with fertilizers or in places completely resown in the past. Today, in addition to the constant deposition of inorganic salts which are typically precipitated in an urban area such as London, much of the eutrophication is caused by the excretions of dogs, and to a lesser extent humans. Large numbers of dogs visit the Heath every day and in the absence of 'dog loos' large amounts of nitrogenous wastes are deposited. There are apparently no detailed estimates of the numbers of dog-visits per day, but assuming this figure averages 1,000 and if each dog leaves 4 oz. of waste, the total would be around 40 tons per annum. The application of similar amounts of nitrogenous fertilizer to natural grassland on a regular basis for a hundred years or more would clearly have a major effect on both the flora and the invertebrate fauna. The effects of this type of ecological shift, common to all urban, suburban and many agricultural areas, has been to reduce the diversity of the flora and to encourage vigorous and opportunistic species of all sorts from magpies to coarse grasses, thistles and nettles. These conditions have been very adverse for large orb-web spinning spiders such as *Araneus marmoreus* and others, but have clearly favoured spiders like the ubiquitous *Oedothorax fuscus* and *Erigone dentipalpis,* spiders which would normally be extremely scarce or absent from undisturbed grassland habitats.

Some management implications and suggestions (adapted from the author's report to the Corporation of London and reproduced with their permission)

From the conservation point of view perhaps the first priority should be the urgent consideration of measures to protect the area of South Heath where the three rarities are known to occur. The patches of coarse grasses and herbs should be discouraged by hand-mowing, and the invading oak seedlings removed. Overall mowing should be reduced, but perhaps disturbance should not be completely eliminated as the open plant community with bare patches of ground may be one of the factors that has allowed tiny spiders such as *Tapinocyboides pygmaeus* and *Lepthyphantes insignis* to survive, and may provide the hunting grounds for *Alopecosa cuneata.*

For the rest of the area, while it is clear that a large open space like Hampstead Heath has to have extensive areas of mown grass for public use the severity, frequency and extent of the mowing regime with heavy equipment should be reduced. Many areas could be mown just once annually in late summer, and a number of areas especially in the central parts of the Heath could be left entirely unmown as are many parts of Windsor Park. The invasion of tree seedlings especially oak, and of vigorous herbs such as thistles, etc., could be dealt with on a selective basis, preferably by hand. Even where mowing takes place the potential benefit of removing nutrients by clearing away the clippings is not at present being done. This contradicts advice by many ecologists concerning the management of grassland habitats, for example Kirby (1992) — 'whatever the cutting regime used, cut material should always be removed from the sward.' In any case mowing is generally thought of as a poor substitute for grazing, partly because of the unnatural uniformity it imposes (Kirby op. cit., Fry and Lonsdale 1992, Duffey pers. comm.).

It is obvious that many areas and the margins of paths will continue to need mowing on a regular basis, but the present methods are leading to unnecessary compacting of the ground and damage to the plant and animal communities, especially where heavy machinery is used in wet areas. Mowers could also be adjusted so as not to cut so near to the ground; at present even slight irregularities in the ground have their tops sliced off; during this study even pitfall-traps set flush with the soil surface were frequently damaged by mowing machinery. Following the recommendations of Kirby (op. cit.) mowing should be varied as much as possible in several respects (area, frequency, timing, etc.) while the occasional opening up of the grass areas to horse-riders could add valuable irregularities to the ground surface particularly of benefit to small spiders.

The small marshy area left unmown above Kenwood Ladies' Pond (where Site 02 was situated) is far too small to be useful; at present, being the only accessible piece of long grass on the Heath it attracts almost every dog owner to throw a stick into it. Regular trampling of the traps in this area and the frequent presence of the sticks indicate that at present, in spite of the dampness of the ground, this is one of the most disturbed and trampled places on the Heath. The area should be left unmown and in addition a buffer zone of at least 25 metres all round it should also be left unmown. Few dog owners throw sticks more than 25 metres so this would make it unlikely that the majority of dogs would ever go into the existing unmown area. Consideration should also be given to fencing off this area to reduce further the total amount of disturbance.

Other areas would greatly benefit from reductions or abandonment of the mowing regime, in particular the banks of the little stream on the west part of South Meadow, the whole of the Bird Sanctuary, the west side of Kite Hill and much of South Heath. Near the stream on South Meadow mowing appears to have had a disastrous effect; this is a wet marshy area yet few marsh species are present and the spider fauna is most unusual for such a wet place with an alarmingly high proportion of 'weed' species; in other words a very artificial assemblage. Yet this is also a site where a single individual of *Porrhomma campbelli,* a scarce linyphiid, has also been found. As well as abandoning mowing, further benefit could be gained by making it more consistently marshy by actually impeding the flow of the stream (as would occur naturally in a semi-wooded area like this), using fallen logs, branches, etc., encouraging the development of small reedbeds and the growth of attractive marshland flowers which have all but disappeared from the Heath. Small log footbridges could be provided to assist walkers cross the area.

In some of the drier heath areas, such as on South Heath, mowing should be much more irregular and confined largely to areas of coarse grass invasions to discourage them and to reduce nutrient levels. Perhaps some of the best natural swards could be fenced off temporarily on a rotating basis to allow recovery from present heavy disturbance, and more generally quite large areas could be designated as 'dog-free zones' where active steps were taken to reduce nutrient levels.

The general aim should be to shift the balance away from encouraging pioneers and disturbed-land species which will inevitably continue to dominate the most heavily used parts of the Heath. There is room for a range of different priorities within the total grassland area to include flower-meadows and other completely undisturbed grass areas. This would encourage the general diversity of the flora and fauna and could see the increase in numbers of orb-web-spinning spiders such as *Araneus quadratus, Araniella cucurbitina* and *Tetragnatha* spp. which are currently disappointingly scarce on the Heath. The disappearance of the large and attractive *Araneus marmoreus* is very likely to have been caused by increased levels of disturbance destroying its large webs. Perhaps it is too much to hope that the Heath could be brought back to its condition in former times, but there is no doubt that the attractiveness as a public open space would be considerably enhanced if the diversity and abundance of both flowers and invertebrates could be increased by more sensitive management of the whole area.

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TABLE 1. Basic trap data.

50% and 75% = diversity of that percentage of the catch.
X = percentage of total numbers represented by the seven commonest 'weed' species.
( ) = catches depressed by periods of waterlogging.

Site	**Characteristics**	**Nos**	**Spp.**	**50%**	**75%**	**X**
1. Hampstead Heath sites						
02	Moist/High D	313	26	4	7	37.4%
03	Dry/Low D	544	43	3	8	4.3%
04	Very moist/Med D	(459)	39	3	11	8.5%
05	Dry/Med-High D	951	24	2	5	66.9%
07	Moist/High D	(426)	27	3	6	57.5%
08	Dry/Med D	726	27	2	5	23.0%
09	Dry/Low D	185	31	3	5	16.8%
10	Dry/High D	995	29	2	4	8.36%
11	Moist/Med D	505	32	4	7	69.8%
Total		5,104 (83 spp.)				
2. Barnes Common						
'Open'	Dry/Low D	471	44	5	10	2.1%
3. Crouch End						
'Lawn'	Dry/High D	681	18	1	2	96%
4. Alexandra Park						
'Heath'	Dry/Med D	1,143	34	3	5	16.9%
'Oak'	Dry/High D	1,561	33	2	3	60.0%
'Tussock'	Moist/Low D	(237)	32	5	11	15.0%

TABLE 2. Disturbance versus abundance and diversity.

	No. of sites	**mA**	**mD**
Low Dist. (H. Heath)	1	544	43
Low Dist. (all sites)	3	417	39.7
Medium Dist. (H. Heath)	2	615	29.5
Medium Dist. (all sites)	4	983	31.5
High Dist. (H. Heath)	4	671	26.5
High Dist. (all sites)	4	673	24.0

mA = mean Abundance mD = mean Diversity

TABLE 3a. The ten most abundant species in the Hampstead Heath catches.

	02	03	04	05	07	08	09	10	11
1. **O. fuscus*	35	1	4	346	123	6	—	191	73
2. **B. gracilis*	39	6	16	40	26	51	2	276	88
3. *P. degeeri*	—	1	1	29	43	306	4	13	5
4. **E. dentipalpis*	2	—	2	51	33	37	—	115	66
5. **L. tenuis*	7	12	13	21	3	45	29	103	45
6. **O. retusus*	32	—	2	114	33	—	—	52	33
7. **E. atra*	2	3	2	28	27	28	—	95	46
8. *P. pullata*	21	137	—	30	5	5	2	4	—
9. **T. vagans*	—	1	4	2	5	105	2	65	2
10. *P. palustris*	3	3	—	91	—	40	—	10	—
*'Weed' totals	117	23	43	602	250	272	33	897	353

* = Seven 'weed' species: the opportunistic species which are characteristic of very disturbed urban sites such as parks and gardens, etc., new sites, waste ground and so on. They are the most widely occurring species (outside buildings) in open urban areas. Some other 'weed' species such as *L. zimmermanni* and *D. latifrons* are commoner in more shaded sites in urban areas; both are common in the wooded areas of Hampstead Heath, but not in the grassland.

TABLE 3b. Catches of common species from other sites.

	BC Open	AP Heath	AP Tussock	AP Oak	CE Lawn
1. **O. fuscus*	—	—	—	8	398
2. **B. gracilis*	1	47	7	8	6
3. *P. degeeri*	2	370	1	518	5
4. **E. dentipalpis*	2	7	17	653	189
5. **L. tenuis*	3	69	11	12	14
6. **O. retusus*	—	—	—	8	—
7. **E. atra*	2	2	—	96	38
8. *P. pullata*	125	156	41	1	1
9. **T. vagans*	2	69	2	152	—
10. *P. palustris*	—	31	—	3	—

* = 'weed' species
BC = Barnes Common, AP = Alexandra Park, CE = Crouch End

TABLE 4.

Part 1. Species list for Hampstead Heath.

Column H gives presumed status on the Heath.
* = species only recorded during this survey.
+ = species recorded elsewhere on the Heath but not in this survey.
( ) = not recorded since 1957 (Savory) or earlier.
o = not recorded from the Heath.
? = status unknown (e.g. probably present but not recorded).

Disturbance level		**Low**			**Medium**				**High**				**Mire**	
	H	03	Open	Tus.	H'th	Oak	08	05	10	11	Lwn	02	07	04
Amaurobius similis	+	–	2	–	–	–	–	–	–	–	–	–	–	–
A. ferox	?	–	–	–	–	–	–	–	–	–	1	–	–	–
Dysdera crocata	+	–	1	–	–	–	–	–	–	–	–	–	–	–
Drassodes lapidosus	+	–	18	–	–	–	–	–	–	–	1	–	–	–
Zelotes latreillei	o	–	7	–	–	–	–	–	–	–	–	–	–	–
Micaria pulicaria	*	1	–	–	–	–	–	–	–	–	–	–	–	–
Clubiona lutescens	+	–	–	–	–	–	–	–	–	–	–	–	–	1
C. reclusa	+	–	–	–	–	–	–	–	–	1	–	–	–	–
Phrurolithus festivus	*	1	–	–	–	–	–	–	–	–	–	–	–	–
Xysticus cristatus	+	21	16	–	23	6	10	9	–	–	–	7	2	–
Philodromus cespitum	+	–	2	–	–	–	–	–	–	–	–	–	–	–
Euophrys frontalis	*	3	5	4	–	–	–	–	–	–	–	–	–	–
Pardosa palustris	+	3	–	–	31	3	40	91	10	–	–	3	–	–
P. pullata	+	137	125	41	156	1	5	30	4	1	1	21	5	–
P. prativaga	+	–	7	1	–	–	–	–	–	2	1	2	–	–
P. amentata	+	53	–	4	1	–	–	4	1	3	–	74	4	11
Alopecosa pulverulenta	+	–	62	16	195	3	2	2	–	–	–	–	5	1

Disturbance level		**Low**			**Medium**				**High**				**Mire**	
	H	03	Open	Tus.	H'th	Oak	08	05	10	11	Lwn	02	07	04
A. cuneata	*	–	–	–	–	–	22	–	–	–	–	–	–	–
Trochosa ruricola	+	3	–	–	1	–	25	10	–	1	–	–	–	–
T. terricola	+	12	7	25	10	1	2	–	–	–	–	–	1	–
Pirata piraticus	+	1	–	–	–	–	–	–	–	–	–	–	–	10
Pisaura mirabilis	+	1	1	1	–	1	–	–	–	–	–	1	–	–
Agelena labyrinthica	(+)	–	2	–	–	–	–	–	–	–	–	–	–	–
Antistea elegans	+	–	–	–	–	–	–	–	–	–	–	–	–	71
Hahnia montana	o	–	50	–	–	–	–	–	–	–	–	–	–	–
H. nava	+	–	2	–	–	1	–	–	1	–	–	–	–	–
Ero furcata	+	–	–	1	–	–	–	–	–	–	–	–	–	–
Theridion bimaculatum	+	–	–	2	–	–	–	–	–	1	–	–	–	–
Enoplognatha thoracica	+	–	9	–	–	4	2	–	–	–	–	–	–	–
Robertus lividus	+	2	12	–	–	–	–	–	–	–	–	2	–	–
Pachygnatha clercki	+	12	–	7	1	–	1	5	4	41	–	23	5	11
P. degeeri	+	1	2	1	370	518	306	29	13	5	5	–	43	1
Araneus diadematus	+	–	–	–	–	–	–	–	–	–	–	–	–	–
Walckenaeria acuminata	+	3	4	2	1	–	–	–	1	2	–	–	–	6
W. antica	+	1	6	–	6	–	2	–	–	–	–	2	2	8
W. cucullata	+	–	–	–	1	–	–	–	–	–	–	–	–	–
W. atrotibialis	+	3	3	–	1	–	–	1	–	5	–	4	–	4
W. nudipalpis	+	–	–	–	–	–	–	–	1	5	–	3	–	6
Dicymbium brevisetosum	+	2	–	1	2	6	2	74	13	16	–	–	59	1
Gnathonarium dentatum	+	–	–	1	–	–	–	–	–	–	–	–	–	14
Gongylidium rufipes	+	–	–	–	–	–	–	–	–	–	–	–	–	3
Hypomma bituberculatum	+	1	–	–	–	–	–	–	–	1	–	–	–	11
Maso sundevalli	+	5	–	–	–	–	–	–	–	–	–	–	–	4
Pocadicnemis juncea	+	46	–	1	1	1	–	–	–	–	–	2	–	2
Oedothorax fuscus	+	1	–	–	–	8	6	414	221	86	398	43	147	5
O. retusus	+	1	–	–	–	8	–	101	22	22	–	24	9	1
Pelecopsis parallela	+	–	3	–	1	7	–	–	–	–	–	–	–	–
Cnephalocotes obscurus	+	–	–	–	–	–	1	–	–	–	–	–	–	–
Tiso vagans	+	–	2	2	69	152	105	2	65	2	–	–	5	4
Troxochrus scabriculus	*	–	–	–	–	–	1	–	–	–	–	–	–	–
Tapinocyba praecox	*	–	3	–	–	–	–	–	1	–	–	–	1	–
Tapinocyboides pygmaeus	*	–	–	–	–	–	3	–	–	–	–	–	–	–
Monocephalus fuscipes	+	7	–	–	–	–	–	–	2	–	–	–	–	–
Lophomma punctatum	+	–	–	–	–	–	–	–	–	–	–	1	–	5
Gongylidiellum vivum	+	–	–	1	3	1	–	6	–	–	–	13	15	–
Micrargus herbigradus	+	93	2	10	4	14	–	–	1	2	–	–	5	3
M. subaequalis	*	–	–	–	–	2	1	–	–	–	–	–	–	–
Savignia frontata	+	–	–	–	–	2	–	1	–	–	–	–	1	–
Diplocephalus cristatus	+	–	–	–	–	–	–	–	–	–	4	–	–	–
D. permixtus	+	–	–	–	–	–	–	6	–	–	–	4	2	16
D. latifrons	+	–	–	–	–	–	1	–	–	–	–	–	–	–
D. picinus	+	7	1	–	–	–	–	1	–	2	–	–	1	126
Panamomops sulcifrons	*	1	–	–	–	5	–	–	–	–	–	–	–	–
Milleriana inerrans	+	–	–	–	–	11	–	–	2	2	3	–	–	–
Erigone dentipalpis	+	–	2	17	7	653	37	51	115	66	189	2	33	2
E. atra	+	3	2	–	2	96	28	28	95	46	38	2	27	2
Leptorhoptrum robustum	+	–	–	–	–	–	–	–	1	13	–	4	3	6
Porrhomma campbelli	+	–	–	–	–	–	–	–	–	–	–	–	1	–
P. microphthalmum	+	–	–	–	–	–	–	–	–	3	–	–	–	–
Meioneta rurestris	+	3	3	–	8	–	–	8	7	1	–	–	–	–
M. saxatilis	+	2	–	–	–	–	–	–	–	–	–	–	–	–
Microneta viaria	+	3	8	–	1	–	–	–	–	–	–	–	–	6
Centromerus sylvaticus	+	15	–	–	–	–	–	–	–	–	–	1	–	–
C. dilutus	+	–	–	2	–	–	–	–	1	–	–	–	–	–
Centromerita bicolor	*	5	–	1	14	12	20	18	21	24	1	17	19	6
C. concinna	+	7	32	7	72	19	–	–	–	–	–	–	–	–
Saaristoa abnormis	+	1	–	–	–	–	–	–	–	–	–	–	–	–
Macrargus rufus	+	–	3	–	–	–	–	–	–	–	–	–	–	3
Bathyph. approximatus	+	–	–	–	–	–	–	–	–	–	–	–	–	13
B. gracilis	+	3	1	7	47	8	51	38	278	88	6	39	26	16
B. parvulus	+	1	1	2	1	1	–	–	–	–	6	–	–	–
Diplostyla concolor	+	42	–	16	2	–	–	–	3	–	6	–	1	45
Floronia bucculenta	(+)	–	–	14	–	–	–	–	–	–	–	–	–	–
Stemonyph. lineatus	+	10	–	19	–	2	–	–	–	2	4	–	–	1
Lepthyphantes minutus	+	–	–	–	–	1	–	–	–	–	–	–	–	–
L. tenuis	+	9	3	11	69	12	45	21	103	45	14	7	3	13
L. zimmermanni	+	–	–	2	5	–	–	–	–	–	–	–	–	8
L. mengei	*	2	–	–	–	–	–	–	–	–	–	–	–	–
L. flavipes	+	–	8	–	–	1	1	1	2	–	1	–	–	1

Disturbance level		**Low**			**Medium**				**High**				**Mire**	
	H	03	Open	Tus.	H'th	Oak	08	05	10	11	Lwn	02	07	04
L. ericaeus	+	7	2	8	7	19	5	–	7	8	0	2	–	2
L. pallidus	+	7	–	1	–	–	–	–	1	1	–	–	2	17
L. insignis	*	–	–	–	–	–	2	–	–	2	–	–	–	–
Linyphia clathrata	+	3	–	6	–	–	–	–	–	–	–	–	–	–

Part 2. Other species recorded from Hampstead Heath.

Atypus affinis: the most recent record is dated 1938, quoted by Savory and Le Gros (1957).

Dictyna uncinata: one record from bushes.

Nigma walckenaeri: recorded on the heath by Savory and Le Gros (1957).

Oonops pulcher: recorded by Russell-Smith (1978).

O. domesticus: recorded by Savory and Le Gros (1957).

Harpactea hombergi: common under bark, etc.

Psilochorus simoni: one record from a house (Ray Softly's) adjacent to South Heath.

Scotophaeus blackwalli: recorded by Savory and Le Gros, almost certainly still present.

C. corticalis: common under bark, etc.

C. terrestris: common in woodland.

C. compta: fairly common in woodland.

C. brevipes: two recent records from woodland litter.

Agroeca brunnea: only record is by Bristowe, probably pre-1939. Recorded (1992) from nearby Coldfall Wood.

Zora spinimana: one record by Russell-Smith (1978). Recorded from several nearby sites.

Micrommata virescens: no modern record.

Diaea dorsata: no modern record.

Oxyptila praticola: one pre-1939 record by Bristowe, (but recorded recently from some nearby woods including Queen's Wood, Highgate).

Philodromus dispar: Two recent records.

P. aureolus: Russell-Smith and two recent records.

Tibellus oblongus: One record by Russell-Smith; probably under recorded.

Salticus scenicus: Savory and Le Gros (1957) record.

Evarcha falcata: The only record is by Bristowe, pre-1939.

Pardosa lugubris: Several recent records from Kenwood.

Tegenaria gigantea: Common in Kenwood, under dead bark, etc.

T. atrica: One recent record.

T. silvestris: common in woodland including Kenwood.

Theridion sisyphium: Most recent record is Savory and Le Gros (1957), but may occur in the Bird Sanctuary and other protected areas.

T. varians: One record from West Heath.

T. melanurum: Russell-Smith (1978).

T. tinctum: Russell-Smith (1978), and recent records from Kenwood and West Heath.

T. pallens: Russell-Smith (1978), probably under-recorded.

Enoplognatha ovata: Russell-Smith (1978), probably under recorded, but one recent record from West Heath.

Tetragnatha extensa: Probably under recorded. Russell-Smith recorded an immature, probably *T. extensa,* and sweep-netting in some places produces many *Tetragnatha* spp.

Metellina segmentata: One recent record, but probably under recorded.

M. mengei: Russell-Smith, and one recent record.

Zygiella atrica: Under recorded. The last record is by Savory and Le Gros.

Gibbaranea gibbosa: Russell-Smith, but has not been recorded recently, though it occurs infrequently in some other nearby woods.

Araneus quadratus: a single specimen swept from tall herbs.

A. marmoreus: no records this century.

Nuctenea umbratica: one recent record.

Araniella cucurbitina: infrequently swept from gorse, etc.
Ceratinella brevipes: a single record by Russell-Smith.
Walckenaeria cuspidata: a single record from West Field Bog (part of Kenwood).
Entelecara erythropus: a single record by Russell-Smith.
Dismodicus bifrons: one recent record from leaf-litter.
Oedothorax gib/tub: several records from marshy places.
Tapinocyba insecta: recent records from woodland litter at Kenwood.
Porrhomma pygmaeum: a single record by the writer in 1985.
Tallusia experta: two recent records from marshy places.
Bathyphantes nigrinus: two records by the writer in 1985.
Kaestneria pullata: one record by Russell-Smith.
Tapinopa longidens: several records from woodland areas.
Taranucnus setosus: one record by the writer in 1985.
Labulla thoracica: last recorded by Savory and Le Gros (1957).
Lepthyphantes nebulosus: Recorded by Savory and Le Gros and by Russell-Smith.
L. alacris: several recent records from Kenwood.
L. obscurus: a single record by Russell-Smith.
L. cristatus: a single record by Russell-Smith.
Helophora insignis: common in woodland in autumn and winter.
Linyphia triangularis: common on bushes.
L. hortensis: recorded last by Russell-Smith but probably under recorded.
L. montana: a single record by Russell-Smith.
L. peltata: a single record by Russell-Smith but probably under recorded.
Microlinyphia pusilla: recorded by Savory and Le Gros (1957), but not seen since.

Book review

Mediterranean wild flowers. Colour paintings by Marjorie Blamey, text and drawings by Christopher Grey-Wilson. HarperCollins. 1993. 560 pp., including 192 pp of coloured plates. £25. ISBN 0 00 219902 7.

This has to be compared with the same author's and artist's *Alpine flowers of Britain and Europe* (1979). That broke new ground in the area of amply illustrated field guides to the flora of its region by attempting to be totally comprehensive except in respect of the rush, grass and sedge families, covering those not depicted in the colour plates which formed the core of the work in the test, sometimes amplified by line drawings. Now we are promised 'a complete guide to the flowers of Mediterranean coasts and islands, native and introduced' taking as the upper limit the 1,000-metre contour. Your reviewer has tested it by rewalking in memory (prompted by diaries) a stretch of the south coast of Crete in May, an area in the foothills of the Cévennes in March and an Italian Adriatic beach in September. Less than one in ten of the flowers seen would have been matchable with Mrs Blamey's paintings, and less than half could have been identified from Dr Grey-Wilson's text. Some of the omissions are distinctive species with narrow distributional ranges, such as *Scutellaria sieberi* and *Alyssum macrocarpum,* others are widespread representatives of complex genera like *Arabis; Thesium* is not mentioned at all. *Aster squamatus* and *Euphorbia prostrata,* both rapidly increasing aliens in Mediterranean Italy and elsewhere, are in but the descriptions would leave the amateur guessing. This work certainly supersedes Polunin and Huxley's *Flowers of the Mediterranean,* but the Mediterranean flora is too large to be treated in this way and the claim to be complete was unwise in a book which many will nevertheless find extremely helpful.

R. M. Burton

Book reviews

Flora europaea. Volume 1, Psilotaceae to Platanaceae. 2nd edition, edited by T. G. Tutin [and nine others]. Cambridge University Press, 1993. 624 pp. £100. ISBN 0 521 41007 X.

The first edition of this volume, with the title *Lycopodiaceae to Platanaceae, Psilotum nudum* not at that time having been discovered in Europe, was published in 1964 and followed by four others, the last in 1980. Although never reviewed in *The London Naturalist,* library copies of *Flora europaea* were widely used by British amateurs before or after visits to countries without easily available national floras in familiar languages, and the influence of its authors' and editors' decisions about nomenclature and sequence can be observed even in such local British productions as the *Atlas of the Kent flora* published in 1982. The publication of a revised edition of a volume of *Flora europaea* therefore deserves notice. That there have been sufficient new discoveries and taxonomic advances to make it substantially different from the first edition is beyond doubt, and the editors are to be congratulated on their manipulation of the fern families to produce the result that the numbering of families in vol. 2 continues to run on from the end of vol. 1. It can still be questioned whether the publication of the revision can be justified. The decision to proceed with it was taken before it was known whether resources would ever be available to revise the remaining volumes. This now seems extremely unlikely, and the reviewer, with benefit of hindsight, ventures to suggest that the user community would have been better served by a journal of annotated abstracts starting in the late 1960s, which would now deal with publications relating to families covered by all five original volumes.

Unfortunately the new volume has had to be set in a smaller and paler type. The uncontrolled column breaks, without the use of that helpful expression *cont.,* preceded by a name at the top of columns, make the index particularly difficult to use; the names in *Dianthus, Ranunculus, Saxifraga* and *Silene* occupy more than a page for each genus! It will be unfortunate if these defects discourage use of the new edition in favour of an out-of-date text.

R. M. Burton

Nature conservation in Richmond upon Thames. John Archer and David Curson. London Ecology Unit. Ecology Handbook No. 21. 1993. 98 pp. £4.95 from the Civic Centre, local bookshops, Richmond Reference Library and Richmond Environmental Information Centre. It can also be ordered direct from the LEU, Bedford House, 125 Camden High Street, London NW1 7JR at £6.20 post free. ISBN 1 871045 18 5.

This is one of a series of Ecology Handbooks produced by the London Ecology Unit on nature conservation in the London boroughs. It provides a guide to areas of wildlife importance within the London Borough of Richmond-upon-Thames and was compiled with help of the Borough Council and interested local people.

It is laid out in two parts, the first being an account of the history of the area, the landscape, geology and different wildlife habitats, and the role of the Borough Council and local organizations. This proves a fascinating and readable introduction for both visitors and local residents.

The second part is devoted to accounts of different sites of wildlife interest grouped into Metropolitan, Borough and Local Importance. These groupings signify: Metropolitan — areas that contain examples of London's best habitats and rare species contained in them, Borough — sites important in a borough perspective, damage to being of great loss to the borough, and Local — an area of interest to nearby residents or neighbouring schools.

It is illustrated with maps and diagrams relevant to the text and also contains some beautiful photographs by the authors and local people. Of particular note is the picture on the back cover of autumn squill *Scilla autumnalis,* one of the Borough's rarer plants. It provides an excellent guide to the more interesting wildlife habitats in Richmond-upon-Thames. When used with others in the series covering neighbouring boroughs they provide a practical and fascinating account of nature conservation in the Capital.

Pippa Hyde

Spider records for the London Area in 1992

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Introduction

The year 1992 did not produce a large number of new records, but the few that were reported were of considerable interest. Two rarities found on Hampstead Heath, *Tapinocyboides pygmaea,* a *Red Data Book* species, and *Lepthyphantes insignis,* a Notable Category B species, both new records for London, have already been reported (Milner 1992).

The main source of interesting species continues to be the pitfall-trapping in a few sites, though ordinary searching and sweeping of vegetation has also produced some good finds. Several new records this year came from Dave Lee, a spider enthusiast from Yorkshire who visited west London in the summer and made a collection at a site which had apparently been neglected by spider enthusiasts, Hounslow Heath, but which turned out to be most interesting. The Heath, which is protected by the local authority, includes some derelict meadowland, some gorse scrub and some secondary oak woodland, and it clearly has an unusual spider fauna including several species not previously recorded in the London Area.

All records not otherwise attributed are by the author.

The records of interest are given below and indicated as follows: * = new record for Middlesex, ** = new record for London county — the old LCC area.

DYSDERIDAE

A fine adult female specimen of *Dysdera crocata* (rather damaged) was sent to me in September by Mrs I. Griffith of Wenlock Road, Hackney. She had observed this beautiful spider walking across her carpet and had called for urgent assistance of an apparently rather violent nature. The post-mortem revealed the sort of injuries to both cephalothorax and abdomen that might be expected from swatting with a rolled-up newspaper, or the dropping of a book from a point vertically above it. The specimen reached me pickled in gin, which I was pleased to note had not caused the colour to fade in the slightest, and had preserved the animal in a relaxed condition.

D. crocata is not often seen indoors, though it can be found in most parts of London.

PHOLCIDAE

In response to my request for records of this very easily identified family, Ray Softly sent a tiny female *Psilochorus simoni* from his house in the South Park area of Hampstead, and Anne Rix sent me an excellent photograph of *Pholcus phalangioides* on its web in her bathroom at Norfolk Road, Uxbridge. These are the only recorded localities in London and Middlesex respectively, although *P. phalangioides* is supposed to be quite common in the area. *P. simoni* was apparently known solely from dry wine cellars until the 1950s (Locket and Millidge 1951–3), but like *P. phalangioides* has apparently extended its range in recent years, possibly due to the widespread use of central heating in buildings of all kinds.

PHILODROMIDAE

Among a number of new records for Middlesex reported by Dave Lee (see above) was a female specimen of *Philodromus albidus** from bushes on Hounslow Heath in June.

SALTICIDAE

Another new record reported by Dave Lee from Hounslow Heath in June was a male of the attractive jumping spider *Heliophanus flavipes**.

THERIDIIDAE

In early August a single female *Enoplognatha latimana***, a close relative of the very common *Enoplognatha ovata,* was found on the small wild area of Blackheath just across the road from the eastern entrance to Greenwich Park. This species is now known to be quite common in the south of England; over 20 sites are known in Essex for example, yet this is the first record so far for London. This may be due to confusion with *E. ovata* from which it can only be distinguished under a microscope.

ARANEIDAE

Several new species from this family of orb-web spiders were recorded for the first time, three of them on Hounslow Heath by Dave Lee in June: *Zilla diodia** (one male), *Hypsosinga pygmaea** (one female), and *Mangora acalypha** (one female). During the Society's spider foray to Wandsworth Common in May a single male *Gibbaranea gibbosa* was swept from young oak trees.

LINYPHIIDAE

The small but rather spectacular black male linyphiid with red legs and a periscope-style ocular tower, *Entelecara acuminata,* was recorded from a pitfall trap in oak-hornbeam litter in the dense part of Coldfall Wood. This was only the second record of the species for Middlesex, the first being from Darlands Lake was reported last year (Milner 1992).

Two specimens of the tiny pale *Tapinocyba praecox* were taken in pitfall traps on Hampstead Heath: a female from a damp part of South Meadow in December 1991 and a male from a drier part of South Heath in April.

A single male of the tiny horned spider *Panamomops sulcifrons* was taken in a pitfall trap at Barnes Common in May 1991, although the specimen has only just been identified. This elusive little spider has now been found at six sites in London (within the area of the North and South Circular Roads) and five of these are from pitfall trapping.

In October, a single female specimen was taken in a pitfall trap in the glade at Coldfall Wood of the tiny *Saaristoa firma**, a relative of the quite common larger woodland money spider *S. abnormis.*

Finally, after the record of the Notable B species *Lepthyphantes insignis* from Hampstead Heath, another male specimen has come to light, this time from Barnes Common in a pitfall catch from May 1991, only recently identified.

Acknowledgements

I wish to thank Dr Peter Merrett for identifying or confirming identifications for most of the records given. Dave Lee's identifications were confirmed by Clifford Smith of the National Spider Survey.

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Survey of Bookham Common

FIFTY-FIRST YEAR

Progress Report for 1992

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General (C. B. Ashby)

Members and others from time to time ask 'What do you actually do at Bookham?' The results of what we do are published annually in *The London Naturalist,* either as papers or progress reports, and last year's issue, No. 71, included a bibliography covering the years 1967–91. The thought behind the question is perhaps less concerned with the results than with the methods of achieving them, and it is very understandable that those unfamiliar with the practicalities of this long-running survey may wonder how they may usefully take part.

The first thing that a newcomer to Bookham is likely to notice is that there is unreserved welcome but very little direction. There is not, for example, a closely supervised survey currently being conducted in which participants are set specific tasks or directed to specific lines of enquiry. Some will see this as a shortcoming, others as a welcome relief. The more experienced participants tend to identify a line of enquiry for themselves or in discussion with others and follow it through. It may or may not achieve results worthy of publication, but it will have required observation, fieldwork and a regular commitment. Some of us find this a very satisfying outlet for our energies, a test of our skills and an all-important learning process.

The aims of the Survey traditionally have been to locate, identify and catalogue the many hundreds of life-forms to be found in the 181 hectares (452 acres) of woodland, grassland and scrub which form the survey area; to trace and record their varying fortunes and to endeavour to understand the interrelationships which exist. Bookham is a National Trust common subjected to active management, and the resultant physical changes have been well documented in our reports. The relentless growth of scrub in the more open areas, the silting up and overshadowing of the ponds, and the ever-thickening canopy of the mature woodlands would, if left unchecked, result in a very few years in uniformity and a lack of the variety of habitat essential to the maintenance of a diverse flora and fauna. Ian Swinney's report on pages 105–6 is a record of the ongoing management of key areas in 1992. It would be instructive and of great value if we could assess the effects of these measures and monitor the re-establishment of the cleared areas in succeeding years. Willing and able as is the present Survey team, it is unlikely that this most interesting potential will be fully realized without additions to our numbers.

The Bookham Survey is a field activity of the Ecology and Entomology Section of the LNHS. The Section's newsletter, *The London Atalanta,* has recently published the results of two ecological surveys conducted independently by members which could very reasonably be held as models for future fieldwork at Bookham. In issues 23 and 24 Ray Softly described his long-term investigation of the Lepidoptera at Hampstead Heath, including a line-transect census of the butterflies. The establishment of such a census at Bookham, already justly renowned for its regular census work and population studies of the birds, is long overdue and would be a most useful contribution. In issues 24 and 25 Eric Groves has given a closely observed account of the re-establishment of one of the Common's outlying ponds, Kelsey's Pond, following excavation and clearance in 1990. Bayfield Pond, which has existed near the western boundary of the Common for at least a century, was similarly remade in 1992 and its recolonization by plants and animals, already under way, is providing similar valuable opportunities for observation and recording. A full-scale investigation of the Isle of Wight Pond, particularly of its continued inability to develop a thriving submerged aquatic flora, awaits the attention of a member or members possessing the required laboratory skills and experience. Some progress has also been made, by the establishment of a series of study quadrats, into an investigation of the effects of the resumption in 1989 of cattle grazing on the scrub-dotted grassland of Division R (Radcliffe 1990). This is an open-ended commitment which could occupy successive teams of botanists and others over a long period, and help with this is urgently needed.

The results of the fifty-first year of the Survey which appear in the following pages continue in full measure the tradition of unflagging interest in the biotope of a defined area. Of the vegetation, our reports this year range from the lowly algae of the standing fresh waters to the wild roses of six species which adorn the Common in their season. A single plant of the scarce *Gnaphalium sylvaticum,* the heath cudweed, reappeared in 1992 after a long absence. Studies of the fungi, the Gramineae and the many microspecies of *Rubus* have continued, but are not yet at the stage of publication. Some outlying parts of the Common which were not previously surveyed for the vegetation have now been incorporated into the study area and are receiving regular attention.

A new study was begun in 1992 of the tardigrades, obscure creatures which spend their lives unseen in a variety of aquatic and terrestrial habitats, notably in bryophytes and lichens. Insects, numerically superior to all other life-forms on the Common, continue to offer unlimited scope for enquiry, and selected species of five orders are discussed in the accounts which follow. Of the bush-crickets, the rare long-winged conehead *Conocephalus discolor,* first noted in 1990, was present in increased numbers on Western Plain in 1992. The jewel-like beetle *Chrysolina menthastri,* also first noted in 1990, was found to be colonizing a patch of water mint beside Lower Eastern Pond. A notable discovery this year has been the tiny ladybird beetle *Clitostethus arcuatus,* a *Red Data Book* species, in South East Wood. Fourteen species of the order Coleoptera are updated in our reports, and are the only published indicators in the London Area in 1992 of this large, important but under-recorded group.

The purple emperor butterfly was said by Colin Plant (1987) to be a species which inhabits only the 'best' woodlands, where mature oaks and ashes are available in the proximity of sallows, on which it lays its eggs. It has been noted at Bookham in most years of the Survey and was again present in 1992. White-letter hairstreaks continue their recovery from the crash resulting from Dutch elm disease, and were to be seen in June flying in the vicinity of regenerating common elms. The Survey has been fortunate over the years in enlisting the active participation of six presidents of the Society. It is with pleasure that we recall that the present holder of that office has been conducting valuable studies of the Odonata at Bookham since 1985. Her report for this year is on pages 109–111.

The breeding-season census of birds in the 16 hectares of Eastern Wood, being a sample of the 112 hectares of mature pedunculate oakwood covering most of the higher ground to the north and east, has been conducted annually with scarcely a break since 1946. The results of ten visits for this purpose in April, May and June 1992 are given on pages 111–2, the robin again being the most numerous species. We are pleased to report that the small heronry continues. On the more open areas, the grasshopper warbler and tree pipit are no longer to be numbered among our summer residents, but nightingales still occur and at least four singing males were present in 1992. There is considerable scope for ornithological investigation on the plains as much of the management work has taken place on those areas. Winter visitors to the Common included two long-eared owls, and in January there was just one sighting of that most elusive of species, the hawfinch.

It is by no means certain that the question 'What do you do at Bookham?' has been adequately answered. What is more certain is that if the Survey is to continue a modest but steady intake of investigators in the field is required. Those with developed skills will need no direction from the Survey team, while others are likely to find that the Survey offers opportunities for useful advancement with a minimum of formality.

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Management work on the Bookham Commons (Ian F. Swinney, National Trust Warden)

During 1992 the Rights of Way Department of Surrey County Council undertook the surfacing of some of the public bridleways on the Commons. This new development may increase pressure on the property through greater visitor numbers, but may relieve disturbance elsewhere, especially during the winter, when some unsurfaced tracks are almost unusable due to the wet, heavy ground. The surfaced paths will be of benefit to management teams in providing easier access to the western side of the Commons.

Many of the tasks performed by the warden and the much appreciated conservation volunteers are designed to serve both the needs of wildlife conservation and public amenity. For example, the rotational cutting of ride-edges is essential to provide new habitats which are rapidly colonized by plant and animal associations. Further clearance of scrub and young trees has been a prominent feature of management work during the year on the Bayfield and Isle of Wight Plains, parts of which now present a very different appearance. Significant areas for the regeneration of unimproved grassland and the re-establishment of sustainable populations of representative species have now been established, whilst retaining a good age range of smaller clumps of scrub within the cleared areas.

After consultation with English Nature, the opportunity was taken whilst machinery was on the Common to clear and deepen Bayfield Pond. This had become seriously overhung by trees and choked by dense growths of scrub and emergent vegetation. Bayfield Pond has a long and varied history and is now once again becoming an interesting and valuable body of water.

The populations of white admiral *Ladoga camilla* and purple emperor *Apatura iris* butterflies have been low in recent years due to a succession of unfavourable summers and they have not recovered since the summer of 1988. Work is in hand to provide future habitats for them whilst being careful not to destroy existing ones. Some scalloping of ride-edges and the creation of glades has been carried out, and further efforts will be made to benefit these two notable species.

The National Trust is pleased to acknowledge the ongoing contribution of the LNHS survey team in promoting a fuller understanding of the ecology and management requirements of Bookham Common, now one of the best-recorded sites in Britain.

Vegetation (Ken Page)

In early summer, colour on the Common is significantly enhanced with the first flowering of our native roses. Widespread in both open and woodland areas, the genus *Rosa* tolerates the wet, heavy soil, and fine specimens of all the six species growing here have been noted. Roses are known to be sexually promiscuous and some of our plants could be hybrids. The following descriptions refer to what are considered to be 'good' species.

Of the five native species recorded for the Common, field rose *Rosa arvensis* is probably the most plentiful. It luxuriates in full sun where the weak, trailing stems intertwine, often forming dome-shaped bushes; alternatively it sprawls in a semi-prostrate fashion a little above ground level. The bushes are covered with a myriad of white blossoms, followed by roundish red fruits tipped with conspicuous and persistent styles. The latter provide a prime character for autumn and winter identification. It is also found in woodland where flowering is less prolific.

Dog rose *Rosa canina,* regarded by most people as *the* English wild rose, is a most handsome shrub with its large white to pink, deliciously fragrant flowers. Much stronger in growth than the preceding species, its stout arching stems may reach three metres or more in height. The large red, egg-shaped fruits are a colourful feature during autumn and often well into winter. It is fairly evenly distributed in woodland and open areas.

Allied to the dog rose is round-leaved dog rose *Rosa obtusifolia.* It was first recorded on the Common in 1991. The two species are superficially similar and separating them requires close inspection. The following characters should help to separate it from *R. canina:* prickles generally more strongly hooked; leaflets rounder, especially their bases, always pubescent on the veins beneath and frequently glandular on the main veins; flowers usually white with shorter, wider sepal lobes. Because of its recent discovery the distribution of this species on the Common is not yet fully known.

For many years a very aged bush of short-styled field rose *Rosa stylosa* has been known on the Common. During scrub clearance it was cut back almost to ground level and may not regenerate satisfactorily. Hopefully, the cleared ground may provide the right habitat for seedling growth. The most striking, and diagnostic, character of the species is the 'disc' at the top of the fruit, which is conspicuously conical. The species is now considered to be a rare plant in the British Isles.

Small-flowered sweetbriar *Rosa micrantha* is generally associated with the chalk downs, but is occasionally to be found elsewhere. On the Common four bushes, one large, three small, grow in a limited area, where the soil is almost certainly acid. This is a highly-scented rose; much of the scent coming from the profusely glandular leaves which emit a powerful aroma when crushed. The stalks of the deep pink flowers and the fruits are also liberally endowed with glands. *R. micrantha* is closely related to *R. rubiginosa* (not present on the Common) from which it can be separated by its glabrous styles.

Many-flowered rose *Rosa multiflora* is a foreigner from eastern Asia. Our plant is very old and may perhaps have been planted by troops during the last war, but apparently not seen by a botanist until 1992! This is a vigorous climber — up to five or six metres high — and eminently suited to clambering through trees and shrubs, which it has effectively done at Bookham. In addition to its vigour this rose is extremely floriferous, bearing large clusters of ten or more individual white flowers, which are followed by pea-sized red fruits. Another feature of the flowers is that of the attractive pinnate sepals.

The most important plant discovery on the Common in 1992 was heath cudweed *Gnaphalium sylvaticum* by E. W. Groves. This was previously reported by A. W. Jones as long ago as 1950, but had not been seen in recent years. The single plant appeared at a site that had been disturbed by conservation work and it is possible that the disturbance brought buried seed to the surface. The species is apparently becoming increasingly scarce in the British Isles.

Algae (C. B. Ashby)

A list of the world's fifty most famous plants would be very likely to include the genus *Volvox*. Noteworthy wherever it appears, *Volvox* in some sites is to be found at all times of the year, at others intermittently or not at all. The most often-quoted species in British waters are *V. aureus* and the closely related *V. globator*. In all the years of the Survey, *Volvox* at Bookham has been elusive, or perhaps non-existent. Regular sampling by Norkett (1949), Le Gros (1972, 1975) and by others since had produced no sign of it, but on 14 August 1991 a sample from Lower Eastern Pond if held up to the light and checked with a hand-lens could be seen to contain the slowly moving green globes of *Volvox*. It appeared again on 12 September 1992, this time in Western Hollow Pond, in greater numbers such that up to ten might be seen together in the microscope field. Observed intermittently over a period of several hours, the containing envelopes of some of the spheres could be seen to rupture, permitting the escape of the daughter cells within. Garnett (1965) described *Volvox* as perhaps the most striking of all the free-swimming algae. 'The first sight of this organism', he continued, 'is one which is unlikely to be forgotten. Even as it becomes more familiar its beauty can still enthrall us, and there is never-ending delight in watching the stately procession of its spheres moving deliberately across the field...'

Another organism of distinctive appearance to be found in the ponds at Bookham is the loricated flagellate *Dinobryon sertularia*. Some authorities now decline to accept that *Dinobryon* is an alga, preferring to list it among, if not the Protozoa, then at least the Protista: single-celled organisms which have the characters of both plant and animal. By whatever name, *Dinobryon* is like no other, each living cell being enclosed in a transparent flask, these in turn being attached end to end to form a branching fan. The successful examination of transparent subjects of low contrast with the light-microscope is very dependent on the preparation being lit to best advantage. A popular technique developed by the Victorian microscopists which still finds application today is that known as dark-ground illumination. Seen thus, *Dinobryon* is a sparkling assembly of glass-like forms gliding mysteriously and silently across a background of black velvet. Although found once in East Hollow Pond, it seems to be particularly associated with Sheepbell Pond. This is one of the Common's northern ponds, secluded and tranquil. Especially in the first three months of the year, *Dinobryon*'s elegant free-swimming colonies may be seen in every drop.

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Tardigrada (Philip M. Greaves)

The Tardigrada of Bookham Common have not previously been surveyed in detail, the only published record being by Ashby (1992). To start what is hoped to be an ongoing survey at Bookham of this neglected phylum, a total of 22 samples of terrestrial moss, lichen and liverwort were taken in August 1992. Currently, 11 of these samples have been examined and tardigrades have been found in six samples. This is a lower proportion than in other surveys (e.g. Morgan 1976), but is probably due to an attempt to sample the representative fauna at Bookham, rather than just the types of moss with which tardigrades are usually associated.

A total of eight tardigrade species have been identified. Four of these have all previously been recorded from Surrey (Greaves 1991) and can be regarded as cosmopolitan; *Hypsibius arcticus* (Murray, 1907), *Diphascon scoticum,* Murray, 1905, *Macrobiotus hufelandii* Schultze, 1833 and *Macrobiotus harmsworthii,* Murray, 1907. Four species have also been extracted which are new additions to the Surrey tardigrade fauna. *Diphascon pingue* Marcus, 1936 and a *Macrobiotus* species of the *intermedius* group, probably *M. intermedius,* were extracted from a creeping-type moss growing on a felled oak trunk at Western Hollow. Final speciation within the *intermedius* group is largely based on egg morphology; unfortunately no eggs were present in the moss sample. Two species which have only been provisionally identified at this stage are *Diphascon prorsirostre* Thulin, 1928 from a creeping moss (site not recorded) and *Isohypsibius schaudinni* (Richters, 1909) from moss on an aspen trunk near Hundred Pound Bridge. Although *I. schaudinni* is reportedly cosmopolitan (Morgan and King 1976), *D. prorsirostre* has only been recorded very infrequently in the UK. However, both these tardigrades require further work to confirm their identification.

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Orthoptera (Ian S. Menzies)

This year *Conocephalus discolor* (Thunberg) was detected in increased numbers, about 10 adults being seen on Western Plain on 29 August, compared with two in 1991. The colony has shown no signs of spreading. *Pholidoptera griseoaptera* (Degeer) was found in several areas on the Bayfield and Central Plains, in addition to the more familiar site on Western Plain, during August and September. In contrast, *Conocephalus dorsalis* (Latreille) seems to be much diminished in numbers compared to 1990 and 1991, and has disappeared, it is hoped temporarily, from sites near Merritt's Cottage and on the Isle of Wight Plain.

Hemiptera – Heteroptera (Ian S. Menzies)

The handsome pentatomid bug *Eurydema oleraceum* (L.) has had another good year. On 23 May 1992 six examples were seen on yellow rocket plants, Bayfield Plain, and further adults were found on white garlic mustard on 20 June and 15 August, Central Plain. The varieties present had either white, yellow or red markings. *Metatropis rufescens* (Herrich-Schäffer), the 'mosquito bug', was seen flying around and at rest on its foodplant, enchanter's nightshade *Circaea lutetiana,* growing in shady places beneath the trees in the Hollows and Eastern Ponds area on 27 July and 12 September.

Coleoptera (Ian S. Menzies)

BUPRESTIDAE

Agrilus viridis (L.): although a well-established site has not been found since the

Sheepbell sallow disappeared, this rare species has continued to occur sporadically. A single female was beaten from a fallen sallow in the arboretum by Mr David Porter on 20 June.

CERAMBYCIDAE

Saperda populnea (L.): one was beaten from an aspen on Bayfield Plain on 25 May. Formerly a plentiful species, it has become scarce in recent years, although the galls are still to be seen on aspen and black poplar.

Phymatodes alni (L.): two were beaten from a dead oak branch near the Bayfield Pond on 23 May. This small and very active longicorn has the appearance of a large wood-ant, especially when seen running rapidly, usually during May and June, along the dead branches and twigs that it inhabits. Unlike some related species, it seems unattracted to hawthorn blossom and other flowers.

CHRYSOMELIDAE

The flea-beetles *Aphthona euphorbiae* (Schrank) and *Longitarsus parvulus* (Paykull) were again obtained in numbers by beating holly and other evergreens. It was noticed that the proportion of *parvulus* compared with *euphorbiae* had increased: in the early months of 1991 the *parvulus:euphorbiae* ratio was approximately 1:20, but rose to reach an incidence of 6:20 on 23 February 1992 in South Eastern Wood, and 60:380 on 20 March 1992 in Hill House Wood. The formerly scarce *L. parvulus* certainly seems to be on the increase. *Longitarsus lycopi* (Foudras) was again abundant on 20 April and 20 June 1992, feeding on *Glechoma* from the Central Plain. It was later found feeding on both *Mentha aquatica* and *arvensis* on Western Plain, 28 August, but has not yet favoured gipsywort *Lycopus europaeus*. Four examples of *Chaetocnema arida* Foudras, a scarce bronze-coloured flea-beetle, were swept from short turf by the side of a path on Bayfield Plain on 20 April.

Chrysomela populi L., previously rather scarce at Bookham, has been seen quite frequently this year, for instance both adult and larval stages were seen on 10 May feeding on aspen from both Bayfield and Eastern Plains.

Chrysolina menthastri (Suffrain): it was a pleasure to see this beautiful chrysomelid feeding in large numbers on *Mentha aquatica* growing at the margin of Lower Eastern Pond. A single (first) beetle was found in 1990, and this year, 1992, it was seen in plenty on 25 July, 29 August, 12 and 17 September.

Chrysolina brunsvicensis (Gravenhorst) was seen again when four examples were detected on *Hypericum quadrangulum*, Western Plain on 22 October by ISM and Dr Roger Booth. *Phytodecta decemnotata* (Marsham) and *P. viminalis* (L.) continue to be quite plentiful, the former on aspen and the latter on sallow. Both were seen on Bayfield and Eastern Plains on 23 May.

Zeugophora flavicollis (Marsham) was observed on several occasions: 29 August on Bayfield Plain and 17 September on both Bayfield and Eastern Plains. Although this species is found mainly on aspen, two were seen this year on black poplar.

COCCINELLIDAE

The minute *Clitostethus arcuatus* (Rossi), one of our rarest 'ladybird' beetles, has been a new discovery for Bookham Common this year. Single specimens were beaten from holly (29 February, ISM) and swept from ivy growing around oak trunks (7 March, Dr Roger Booth and 14 August, ISM) in the same area of South Eastern Wood. This species, which is classified *Red Data* 1, has previously been recorded in small numbers from Oxfordshire and Suffolk. There is a single record from the vicinity of Box Hill, Surrey more than 50 years ago.

Lepidoptera (Ian S. Menzies)

A grizzled skipper *Pyrgus malvae* was observed ovipositing on the leaves of tormentil on Central Plain on 10 May. A male purple emperor *Apatura iris* was seen flying over oaks near Merritt's Cottage on 29 June. White-letter hairstreaks *Strymonidia w-album* were seen flying in good numbers around common elms, and visiting flowers of bramble and hogweed on Central Plain adjacent to the railway station on 20 and 29 June.

Odonata (Ruth Day)

There is more to damselfly population dynamics than has so far been revealed by my survey. In 1991 the azure damselfly *Coenagrion puella* was largely absent from Lower Eastern Pond from May to August, though I found it in very small numbers there and at other ponds: 23 May 1991, 3 teneral *C. puella* at Sheepbell Pond; 20 July 1991, 3 males and 2 females at Lower Eastern Pond; 1 August 1991, a few males at East and West Hollow Ponds; 2 August, 7 males at each of Sheepbell and Kelsey's Ponds; 3 August, 1 male at South East Pond. I noted therefore that it appeared to have been replaced by *Lestes sponsa* at South East and Lower Eastern Ponds.

In May 1992, however, *Coenagrion puella* was back in its usual abundance at Lower Eastern Pond. I did a mark/recapture study of the males on 26, 28, 30 and 31 May 1992. On each of these dates I captured approximately 40 individuals and I obtained population estimates of 193 for 28 May and 664 for 30 May, using Jolly's stochastic method (Begon 1979). South East Pond in 1992 had been reduced to a miserable trickle of water meandering through a swamp of *Glyceria fluitans*. It was therefore a shadow of its former self as far as damselflies were concerned. Sheepbell Pond, on the other hand, had improved. The great storm of 16 October 1987 knocked over a few overhanging trees, and that and some management work by the warden had somewhat reduced the shade. The number of damselflies perched around the edge had therefore increased, and I was able for the first time since starting this study in 1985 to obtain statistically adequate data for *C. puella* at this pond. I captured 10 males on 26 May, 13 on 28 May, 30 on 30 May and 41 on 31 May. Jolly's stochastic method gave a population estimate of 98 for 28 May and 1,410 for 31 May. This latter figure seems too high and is probably accounted for by the substantial increase in captures on 31 May. Five or six individual *Pyrrhosoma nymphula* were also present during this period at Sheepbell and Lower Eastern Ponds, and one was seen at South East Pond on 23rd May. *Libellula depressa* was seen at South East, Sheepbell, Kelsey's and Bayfield Ponds on 23 May. Pairs oviposited at Sheepbell Pond on 28 and 30 May and at Lower Eastern Pond on 31 May.

In June 1992, *Calopteryx splendens* reappeared. It does so regularly in low numbers, despite my earlier efforts to dismiss its presence as a product of freak wind conditions. Ron Kettle found two males perched on trees in Eastern Wood and another beside Western Hollow Pond on 13 June. On the same date I saw one at Kelsey's Pond, one at Lower Eastern Pond, one at East Hollow and two at West Hollow. There was one at Sheepbell Pond on 15 July and one at Isle of Wight Pond on 18 July. Butler (1985) found that when he reared the larvae of British species in captivity, only *Calopteryx virgo* depended on aeration. The other stream dwellers, including *C. splendens,* could be reared without it, provided temperature and water depth were kept 'reasonably low'. These conditions could be achieved in the Bookham ponds, but proof of breeding would depend on finding larvae or exuviae, and the chance of that is fairly slight.

By July, the recently redug Kelsey's Pond had established itself as the second best dragonfly pond on the Common. *Anax imperator* was seen there regularly. Two females were ovipositing into the water crowfoot on 13 June. *Libellula depressa, Anax imperator, Aeshna cyanea, Sympetrum sanguineum, Coenagrion puella* and *Lestes sponsa* all appeared there together on 16 July. Possibly the male *Aeshna juncea* Ron Kettle saw near Hundred Pound Bridge on 10 October was on its way there. *Aeshna grandis,* however, appeared to prefer the main group of ponds. Individuals were seen at West Hollow and Lower Eastern Ponds on 18 July.

By this time, *Coenagrion puella* had virtually disappeared from Lower Eastern Pond. One was captured on 15 July, but none thereafter. I did a mark/recapture study there from 15 to 18 July and obtained results for *Lestes sponsa* and *Sympetrum sanguineum.* I caught 40 male *L. sponsa* on each of these days, obtaining 'Jolly' population estimates of 249 for 16 July and 328 for 17 July (Begon 1979). Because the darters were larger, I gave them individual rather than date numbers, using Hinnekint's (1974) system. As they perch obligingly on the reeds, it is possible thereafter to read their numbers without netting them. The 'Jolly' population estimates for male *S. sanguineum* were 42 for 16 July and 21 for 17 July.

Ischnura elegans, which is a very widespread species, has always been present in low numbers at Bookham Common ponds. Once again it was found at Lower Eastern and Kelsey's Ponds on 15–16 and 18 July respectively.

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Birds (Ron Kettle)

The Common Birds Census in Eastern Wood — 16 hectares of oak woodland — was continued by R. K., who made 10 visits in April, May and June. The potentially breeding species and the number of territories held by each were:

Stock dove *Columba oenas*	1
Cuckoo *Cuculus canorus*	1
Green woodpecker *Picus viridis*	1
Great spotted woodpecker *Dendrocopos major*	3
Wren *Troglodytes troglodytes*	19
Robin *Erithacus rubecula*	35
Blackbird *Turdus merula*	10
Song thrush *Turdus philomelos*	3
Mistle thrush *Turdus viscivorus*	1
Blackcap *Sylvia atricapilla*	2
Chiffchaff *Phylloscopus collybita*	3
Long-tailed tit *Aegithalos caudatus*	2
Marsh tit *Parus palustris*	2
Coal tit *Parus ater*	5
Blue tit *Parus caeruleus*	20
Great tit *Parus major*	14
Nuthatch *Sitta europaea*	3
Treecreeper *Certhia familiaris*	1
Jay *Garrulus glandarius*	3
Carrion crow *Corvus corone*	3
Chaffinch *Fringilla coelebs*	5
Bullfinch *Pyrrhula pyrrhula*	1

Woodpigeons *Columba palumbus* and starlings *Sturnus vulgaris* nested, but were not censused. Robins, blue tits and great tits recovered most of the losses suffered in 1991, but wrens increased only slightly. Blackbird numbers have been declining steadily over the last few years and are now back to the level in the 1970s, and song thrushes dropped from five to three pairs. For the first time for many years there were no dunnocks *Prunella modularis,* probably as a result of the maturing of a patch of scrub, which may account also for the absence again of willow warbler *Phylloscopus trochilus.* Sparrowhawks *Accipiter nisus* did not occur here this year.

Ian Swinney found two long-eared owls *Asio otus* roosting in the Western Plain area in January and February. He also saw a hawfinch *Coccothraustes*

coccothraustes on Central Plain on 20 January. There was more than one kingfisher *Alcedo atthis* sighting, single birds being seen at Kelsey's Pond on 10 July, along the Bookham Stream on Eastern Plain in August, and by C. B. Ashby on Lower Eastern Pond on 11 September.

There were four occupied herons' *Ardea cinerea* nests in the small colony in Central Wood, three of which had young in early May. There may have been one or two nests elsewhere. Canada geese *Branta canadensis* nested on the Isle of Wight Pond and did unfortunately breed successfully this year on the Upper Eastern Pond. Two or three mandarin ducks *Aix galericulata* were noted on various ponds from time to time but there was no evidence of breeding. A teal *Anas crecca* was present on Upper Eastern Pond on 10 October. Moorhens *Gallinula chloropus* had a good year, breeding almost certainly on the Isle of Wight and all four Hollow Path Ponds.

At least four nightingales *Luscinia megarhynchos* were singing on Central and Bayfield Plains in May, and a wood warbler *Phylloscopus sibilatrix* sang near Hundred Pound Bridge on 10 May. Marsh tits were more evident than usual. In view of their recent general decline, it was good to see a pair of linnets *Acanthus cannabina* on Central Plain on 13 June.

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Book review

Bugs of the world. George C. McGavin. Blandford (Cassell), London. 1993. 192 pp. £16.99. ISBN 0 7137 2221 5.

This is probably the first book in English to give an overview of the true bugs of the world. A similar book was published over sixty years ago (Weber 1930), but that was in German. By bugs the author refers to that order of piercing and sucking insects known as the Hemiptera. This includes the two suborders, Heteroptera (the plant bugs) and Homoptera (which includes the leafhoppers, froghoppers, cicadas, jumping plant lice, whiteflies, aphids, scale-insects and mealy bugs). The whole order comprises over 80,000 species.

Following a preface and useful introduction there are chapters on collecting and storing of bugs, their classification, diseases and enemies. Examples from the various species in the families of each suborder are given, particularly noting those that may be of economic importance. Many of the bugs have evolved defence mechanisms including bizarre forms of camouflage such as resembling other noxious insects, leaves or spines, or being cryptically coloured. Some produce repellent secretions from certain glands to ward off potential enemies. These and others are described in a fascinating chapter entitled 'Bug Defences'. The author completes the survey with a general description of food and feeding, mating and egg-laying, and gives a final chapter on the role of bugs and man.

The book is illustrated throughout with the excellent coloured photographs of Ken Preston-Mafham, whose superb camera work adorns other titles in this series.

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Eric W. Groves

Botanical records for 1992

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Summary

The most interesting records of ferns and flowering plants from the London Area received in the past year are presented, together with some observations about the quantity and sources of records received and the quality of geographical information appropriate for them. *Cotula coronopifolia* and *Senecio vernalis* have been recorded in the London Area for the first time.

Introduction

In 'Botanical records for 1991' (Burton 1992) I approached the problem of indicating which plant species are sufficiently uncommon to be worth submitting records of by listing those which are too common. Unfortunately, as pointed out by Alan Gibson, my Table 1, listing species which are found throughout the London Area, should also have included *Anthriscus sylvestris, Bellis perennis, Capsella bursa-pastoris, Chamaenerion angustifolium, Cirsium arvense, Cirsium vulgare, Matricaria matricarioides* and *Potentilla reptans.* Some of these omissions were also noticed by others, and one member assumed that the daisy was left out on purpose, being a rare plant in areas without sufficient garden lawns! Mr Gibson supposed that I had also intended to include bristly ox-tongue *Picris echioides* in Table 1. Twenty years ago this species was a common weed near the Thames in Kent and Essex, but in the rest of our area was of very scattered and often only temporary occurrence. Since then it has increased considerably, but there are still many places in the London Area where it cannot be found, so that any information about its present status in particular localities will contribute to an overall picture of its spread.

This year my emphasis will be on the amount of detail which it is appropriate to include in a record. However, for the presentation of records received, I will revert to the sequence of Watsonian vice-counties in our area. The London Natural History Society records in a circle of radius 20 miles centred on St Paul's Cathedral. Watson (1873) devised a system for dividing Great Britain into vice-counties, less unequal in area than the counties of his day, for the purpose of charting the distribution of British plants, which is still in use. Our circle includes all of his Middlesex and parts of five other vice-counties. The territory of the present London boroughs includes parts of four vice-counties, the exceptions being North Essex and Bucks., and is entirely within the circle. The sequence of the following paragraphs is by vice-counties in number order, and within each vice-county starts with the part within London boroughs. The first records here, therefore, are those from the London Boroughs of Bexley, Bromley, Greenwich and Lewisham.

V.C. 16, West Kent

From these four boroughs, I have about a hundred records to add to the database, including some taken from the reports of the Sidcup and District Natural History Society, the Wild Flower Society (Laxton 1993) and the Orpington Field Club. The WFS went to Cuckoo Wood and found a hybrid dock *Rumex obtusifolius* × *sanguineus* and white mullein *Verbascum lychnitis,* as well as the well-known rarities of the place, whose continued presence is thereby confirmed. Most of the OFC records were also supplied to me direct by Joyce Pitt, including early purple orchid *Orchis mascula* and a corn-salad *Valerianella dentata* near West Wickham; the latter was first found by Sue Swales and Ishpi Blatchley, and when Mrs Pitt went to confirm it, she found also Venus's looking-glass *Legousia hybrida* and other characteristic weeds of chalky fields in what is probably their nearest place to central London. She also supplied me the first, and I hope the last, record of New Zealand pigmy-weed *Crassula helmsii* from Erith Marshes, and told me about bee orchids *Ophrys apifera* and pyramidal orchids *Anacamptis pyramidalis* at Crayford Rough. She sent me a specimen of a *Thalictrum* which I judge to be the garden race 'Adiantifolium' of lesser meadow-rue *T. minus.* This locality was also visited, without knowing a name for it, by John Palmer and by myself; my visit had been much earlier in the year, in time to find whitlow-grass *Erophila verna* and in nearby grassland lesser chickweed *Stellaria pallida.* Cuckoo Wood is probably the same as Elizabeth Norman's High Elms locality for the hybrid *Verbascum lychnitis* × *thapsus;* the lack of detail hardly matters in the case of a sterile hybrid between annual or biennial species.

I invariably have a problem selecting from Mr Palmer's records. Many of them are of garden plants for which he provides the first evidence of the potential for naturalization, such as *Viburnum rhytidophyllum* on a railway bank at Crayford, perhaps planted originally but suckering for up to 15 feet, or the seedling *Mahonia japonica* on a path in Eaglesfield Park in Greenwich. If these turn out to be the beginnings of established populations, then later they will seem to have been worth mentioning, and there may be reason to regret that he did not supply more complete details of the locality. Where this specialization is especially useful is in the supply of descriptive detail, such as the untypical features of a single five-foot specimen of var. *laciniatum* of silver maple *Acer saccharinum* in 'natural vegetation' on Bostall Heath. This gives a very poor impression of the variety and number of his records, in this part of the London Area exceeded only by my own, which are mostly of much less rare plants or mere confirmations of older records, like the naturalized common amaranth *Amaranthus retroflexus* at Hockendon which I previously saw more than twenty years before.

This locality is only just in Bexley, not Kent. More central by the A20 was the hybrid dock *Rumex cristatus* × *obtusifolius* found by Mr Kitchener near Crittalls Corner, with descriptive data supplied, and even farther in the population of reflexed saltmarsh-grass *Puccinellia distans* at Mottingham of which very precise details were sent to me by Paul Harmes. Brian Herring supplied full localization of his records of viper's bugloss *Echium vulgare* and other plants at Grove Park. Ken White sent me a list of three ferns and two old grassland plants, germander speedwell *Veronica chamaedrys* and lady's bedstraw *Galium verum* from in or near Lewisham parish churchyard.

For that part of Watson's v.c. 16 which is in our circle but outside London, I have records supplied by Mr Kitchener, Mrs Pitt, Mr Palmer and myself, though of my own finds I will mention only the Danish scurvy-grass *Cochlearia danica* bordering the central reservation of the Swanley by-pass, whereas Mr Kitchener saw it in many similar places on the M20 and M25. We both noted substantial plants of the Hungarian brome *Bromopsis inermis* near Lullingstone Park Visitors' Centre, but I overlooked the similarly introduced *Festuca rubra* subsp. *megastachys.* Mr Kitchener led the WFS meeting already mentioned, which on 26 June, with permission, explored the millstream at Farningham, though part of the substantial population of maidenhair fern *Adiantum capillus-veneris* which they found can just be seen from the road. Among Greek dock *Rumex cristatus* which was being gathered on Dartford Marshes for use in a dried-flower arrangement, he found a single plant of its hybrid with the common blunt-leaved dock *R. obtusifolius.* Visiting the nature reserve at Longfield established for the protection of grey mouse-ear *Cerastium brachypetalum,* he was astounded by the sight of the alien *Vicia dalmatica,* appearing as if put there to delight the eye of the visiting botanist.

Mrs Pitt reported field gromwell *Lithospermum arvense* in a chalky field near Otford, where it grew with rough poppy *Papaver hybridum,* first found by

Marion Nalder and others, and our two wild pansies *Viola arvensis* and *V. tricolor* in a gravelly field at Crockenhill, where, with hybrids, they were still flowering in December. In and near Dry Hill picnic park, established in and around the ragstone quarries where forty years ago Francis Rose found maiden pink *Dianthus deltoides* (which is no longer there), she found broad-leaved helleborine *Epipactis helleborine,* bee and pyramidal orchids, and in an adjacent set-aside field musk thistle *Carduus nutans,* which is rarely seen in this part of our area. Meenfield Wood west of Shoreham was devastated by the storm of 16 October 1987, but the effect of clearance of the damage has been to make it look worse; however yellow bird's nest *Monotropa hypopitys* could still be found in the small strip of woodland remaining, whereas it appears not to have survived in a similar site between Romney Street and Upper Austin Lodge.

I referred before to the difficulty of selecting from Mr Palmer's records. There are twelve and a half sides of A4 paper relating to the London Area as a whole in 1992. Page 1 consists largely of named *Narcissus* varieties in the wild, but on other pages there are observations confirming the persistence of plants seen years before. New are *Cotoneaster subminutiflorus* abundantly naturalized in neglected hospital grounds at Dartford, a few plants of tree-spinach *Chenopodium giganteum* on new earth-banks between Dartford and Hawley, a natural double common poppy *Papaver rhoeas* in a rape crop at Horton Kirby, rescue brome *Ceratochloa cathartica* at Eynsford which I had failed to spot myself although I pass within a few yards of it daily, and mat-grass fescue *Vulpia unilateralis* in Blue Water Pit at Stone, found when surveying this large former chalk quarry with Eric Philp.

Quercus mas needs a paragraph to itself. Mr Palmer has already announced his discovery of oaks of this species near to Darenth Wood in a letter to *BSBI News.* The description of the foliage in the reference works available to him (e.g. Schwarz 1964) matches his trees well enough, but as these works give the native range of *Q. mas* as southern France and northern Spain, and the name is nowhere to be found in standard French and Spanish floras, I thought it might be worth further investigation. All the modern use of Thore's name *Quercus mas* derives from the pre-war work of Schwarz (e.g. 1936–9) who rescued it from oblivion, and illustrated a Spanish specimen. Schwarz took the name from Thore (1803), but had never been able to examine any of the specimens available to Thore. This defect was made good by Jovet (1985) who tracked down the specimens supplied to Thore, still preserved in a local museum, and ascertained that they were identical with sessile oak *Q. petraea,* a species absent from his own neighbourhood. The name *Quercus mas* is therefore unusuable, so what is the clearly different oak figured by Schwarz (1936–9)? The answer was supplied by Franco and López (1987) in the course of preparing *Quercus* for the new *Flora ibérica.* They found that there were oaks in northern Spain, in an area further east than that visited by Thore's correspondents, which were uniformly distinct from *Q. petraea* and replaced it geographically, and described it as a new subspecies *huguetiana.* How *Q. petraea* subsp. *huguetiana* got to Kent is not clear — it is surely too far from the Pyrenees for a bird to have carried an acorn — but further inquiry is clearly called for, for instance to search for seedlings intermediate with subsp. *petraea* which is in Darenth Wood, so it is a pity that Mr Palmer has not indicated very precisely where his trees grow.

V.C. 17, Surrey

Mr Palmer reports seeing deadly nightshade *Atropa belladonna* and tall nightshade *Solanum chenopodioides* in Bermondsey, and no less centrally located was the group of bur-parsley *Anthriscus caucalis* I found in the Jubilee Gardens near County Hall. Peter Holland reports Guernsey fleabane *Conyza sumatrensis* from a tetrad in Brixton, but in this case finds of this spreading urban weed are just as remarkable in more suburban localities; I found it myself in Kingston and Richmond.

The flora of derelict drying beds of Kew sewage works has been studied by John Latham, and on 4 July he led our meeting there, the report of which mentions many berried shrubs, such as species of *Cotoneaster, Sorbus* and *Lonicera,* bearing witness to the attractiveness of this site to birds. Weeds here were round-leaved cranesbill *Geranium rotundifolium* and great lettuce *Lactuca virosa,* both species which are increasing rapidly in London. Different sites around Kew were visited by the meeting on 10 May held in conjunction with the Annual General Meeting of the Botanical Society of the British Isles. Near the Thames nearer Richmond, nothing could be seen of small-flowered winter-cress *Barbarea stricta* which occurred here regularly until at least 1990. Mike Mullin's report of this meeting (in *Watsonia* **19:** 207) mentions the Mediterranean thistle *Galactites tomentosa* as an abundant alien in Kew churchyard, but Mrs Norman says that it had disappeared by July. After the meeting I confirmed the continued presence in Richmond Park of blinks *Montia fontana,* upright chickweed *Moenchia erecta* and pill sedge *Carex pilulifera.*

Other records by Mrs Norman include sickle medick *Medicago falcata* and freely-flowering self-sown false acacia *Robinia pseudacacia* on Barnes Common. Ron Parker sent me a list of records, mostly with six-figure references indicating that the plants are in the Cheam area, confirming that ivy broomrape *Orobanche hederae,* round-leaved dog-rose *Rosa obtusifolia* and American speedwell *Veronica peregrina* can still be found thereabouts. Diana Willment made the chance discovery of buttonweed *Cotula coronopifolia* by the pond at the north-west corner of Ham Common, where it must surely be a recent arrival. This South African composite is naturalized in damp places in coastal regions in many parts of the world, but had not been recorded in the London Area before 1992.

The work of the London Ecology Unit has been mentioned before in these pages since its original habitat survey in 1984. The Unit continues to be active in those boroughs which continue to support it now that there is no longer a Greater London Council to maintain it, updating the original survey to produce illustrated 'Ecology Handbooks' for each borough. A typical handbook starts with an excellent account of local history and geography, and of relevant activity in the borough's schools, produced with the help of the borough's own officers in many cases. The body of the handbooks is a description of sites of nature conservation value in the borough, starting with those of greatest interest; in the descriptions vegetation is given due importance. Naturally your plant recorder is keen to maintain a close liaison with the Unit, for mutual benefit; its surveys contribute to our records, and we are often invited to give advice based on our knowledge and experience during the preparation of the handbooks. In 1992 the Unit went through the preliminary stage of circulating a schedule of sites in the Borough of Merton, and produced draft handbooks on nature conservation in Lambeth, Sutton and Richmond-upon-Thames. The text on Lambeth, based on a resurvey in 1991, illustrates the value of the site descriptions in the inner boroughs, picking out habitats for species common only further out, such as soft rush *Juncus effusus* on Streatham Common, but also in Agnes Riley Gardens about four kilometres to the north. The Sutton draft contains the first mention I had seen of autumn lady's-tresses *Spiranthes spiralis* in Beddington Park, where it was first found by Robert Stambridge, a gardener there, in 1989. Also in 1992, in April, the London Ecology Unit published its handbook *Nature conservation in Kingston-upon-Thames,* so a lot of its activity last year was concerned with v.c. 17.

Another fruitful source of Surrey records is the annual *Surrey Flora Committee Newsletter* compiled by Joyce Smith. Records for 1992 extracted include Himalayan cranesbill *Geranium himalayense* well naturalized in Carshalton churchyard found by Julia Leslie, Ken Page and Mrs Smith, and yarrow broomrape *Orobanche purpurea* 'of natural occurrence' in the Natural Order beds at Kew Gardens, found by Tom Cope and Brian Spooner. Just outside the

London (Sutton) boundary, Olive Maunder is reported as having seen two green-veined orchids *Orchis morio* and some henbane *Hyoscyamus niger* on Banstead Downs. Henbane was also seen at Addlestone 'pick-your-own' farm by Barry Phillips and Ken Page, as well as *Conyza sumatrensis,* here at its farthest locality from London in this direction. Mr Page saw thousands of rue-leaved saxifrage *Saxifraga tridactylites* at Tattenham Corner in the company of Mrs Smith and Mrs Leslie, and more on the river-bank at East Molesey with Mrs Smith. Gwyneth Fookes is credited with 100 each of slender bedstraw *Galium pumilum* and chalk milkwort *Polygala calcarea* on Purley Downs Golf Course and six plants of early gentian *Gentianella anglica* on Oxted Downs. Large numbers of frog orchid *Coeloglossum viride* are shown as having been seen on Box Hill by M. J. Halley, but given the extent of precision which can be expected when referring to localities in this context, it is impossible to be certain that this is within our area.

Our meeting on 28 June confirmed many rarities from Runnymede, at the very edge of our circle, including greater dodder *Cuscuta europaea* and orange foxtail *Alopecurus aequalis.* Mr Kitchener saw *Cochlearia danica* in several places on the M25 from west of Junction 8 almost to the Kent boundary. Eric Groves's rediscovery of heath cudweed *Gnaphalium sylvaticum* on Bookham Common is likely to figure elsewhere in this issue of *The London Naturalist.* (See pp. 104 and 107. Ed.).

V.C. 18, South Essex

John Archer of the London Ecology Unit passed on to me details of field madder *Sherardia arvensis* found by Ian Yarham in mown turf near Barking church. From the six-figure grid reference in the tabulated two years' records sent to me by George Hounsome, I infer that the 'single tuft in woodland' of prickly sedge *Carex muricata* was in Epping Forest.

V.C. 19, North Essex

Mr Hounsome's brown sedge *Carex disticha* and fodder burnet *Sanguisorba minor* subsp. *muricata* are from the neighbourhood of gravel pits near Fishers Green, on the Essex side of the Lea.

V.C. 20, Herts.

Part of the London Borough of Barnet is in vice-county 20. The borough was surveyed by the London Ecology Unit in 1992, and David Curson sent me a fully detailed list of records of species which the LEU treats as 'notable', defined as occurring in less than 15 per cent of London tetrads according to Burton (1983). This procedure results in a shorter list of notable species than the one I described last year (Burton 1992), because it leaves out ones which are common in some boroughs but very rare in others, such as *Picris echioides* mentioned in the introduction. The survey covered all sites of more than a quarter of a hectare, other than private gardens, and produced 167 records of 68 notable species. The identity of trailing St John's-wort *Hypericum humifusum* in scrub at the north-west corner of Dyrham Park Golf Course, i.e. just in v.c. 20, is said to need confirming, though the record seems a reasonable one. No notable species are listed from Rowley Green, though Diana Griffith identified *Callitriche hamulata* as well as the common water-starwort *C. stagnalis* from there. Dr Griffith sent me useful comments on the list of notable plants as defined by me last year, based on her own observations around Totteridge, in both v.c. 20 and v.c. 21. Anthony Vaughan also went to some trouble to work out the local significance of my lists, and sent me a well-detailed list of what he regards as notable species, with six-figure map references and the vice-county clearly indicated. Most are from v.c. 20, and include what may be the first record from Barnet of spotted medick *Medicago arabica* from dull, mown grass in a residential area, and expertly determined *Epilobium* hybrids, *Salix* hybrids, *Hieracium* and *Carex*. The boundary between the two vice-counties runs through the middle of Darlands Lake Nature Reserve, visited by our meeting on 26 April, when several seedlings of the bay tree *Laurus nobilis* were found. David Bevan pointed out the curious proximity of Laurel Farm!

The greatest quantity of Hertfordshire records received, through the kindness of Trevor James, are from all parts of the vice-county within our area, and derive from the Hertfordshire Flora Survey started in 1987, largely on his initiative. The layout of the recording form used encourages the supply of grid references and other useful details of less-common species. I cannot name all the contributors to the survey whose records are getting into our files by this route, but significant quantities of records are due to Shirley Watson in the Stort Valley, David Marshall around Hatfield, Gerald Salisbury and Jill Saunders around Rickmansworth and northwards, and Ken Jackson in Colney Heath and places near. Unfortunately the survey lacks anyone based in St Albans. The survey has turned up hemlock water-dropwort *Oenanthe crocata* near Watford, found by Olive Linford in 1989, shepherd's needle *Scandix pecten-veneris* in two places in our area and *Cochlearia danica* along all the major roads, though the M1 is not well covered. Trevor's own records include the first record of eastern groundsel *Senecio vernalis* in our area, in a car-park in Northaw, *Stellaria pallida* near our northern boundary, a garden honeysuckle *Lonicera henryi* 'invading Sherrardspark Wood' (with D. Furley), non-flowering tor-grass *Brachypodium pinnatum* in the chalk-pit by the canal near Watford and slender thistle *Carduus tenuiflorus* at Grove Mill. A broomrape he found on teasels at Hertford appears to be the nationally rare species *Orobanche artemisiae-campestris,* though this requires confirmation.

Two contributors to the Hertfordshire Flora Survey also sent me their own records direct. In the case of Ann Boucher, the list (for 1991 and 1992) is longer even than John Palmer's mentioned under Kent, indicating the enormous amount of time she has put into the survey. All these date from 1991: our first v.c. 20 record of lesser sea-spurrey *Spergularia marina* forming a large patch on a roadside very close to the M1; our first v.c. 20 record of buck's-horn plantain *Plantago coronopus* since 1914, on a gravelly roadside verge at the edge of our area near Hertford, and in the same area our first v.c. 20 record since 1967 of an uncommon chickweed little mouse-ear *Cerastium semidecandrum;* about 30 plants of corn buttercup *Ranunculus arvensis* in a set-aside field near Balls Park; and about a hundred plants of oak-leaved goosefoot *Chenopodium glaucum* on a farm dunghill, on the same farm but not in the same place where Mrs Boucher had also seen it in 1989. Peter Ellison also supplied me full details of his finds where their importance justified it, as in the case of great burnet *Sanguisorba officinalis* of which he found a very few plants in a small grassy area quite close to the centre of Watford, the dozen plants of fiddle dock *Rumex pulcher* in a grassy field near the canal at Rickmansworth, and sites for coral-root *Cardamine bulbifera*.

Finally I had a list of 1990–2 records from Ian Johnson, giving useful confirmation of large bitter-cress *Cardamine amara* at Stockers Lake, green hellebore *Helleborus viridis* at Maple Cross and rusty-back *Ceterach officinarum* at Mill End, all with six-figure grid references.

V.C. 21, Middlesex

This vice-county is almost all in London boroughs, including parts of Richmond-upon-Thames and Barnet already mentioned, and all of Camden and Hammersmith & Fulham. The best Middlesex records from the London Ecology Unit's survey of Barnet are the rare blunt-leaved pondweed *Potamogeton obtusifolius* in a field-pond on Moat Mount Farm, dyer's greenweed *Genista tinctoria* by a fairway of Mill Hill Golf Course, *Oenanthe crocata* and downy oat-grass *Helictotrichon pubescens* in Islington Cemetery, Finchley, in small quantity and not near each other, and a good amount of *Sanguisorba officinalis* on Edgware Way Rough. A draft *Nature conservation in Camden* was circulated in 1992. It mentions navelwort *Umbilicus rupestris* on a wall near Holborn which is now in a school nature garden, a very surprising record. Regent's Park and Hampstead Heath are in Camden, but I had to report that I have had no records of London rocket *Sisymbrium irio* at the Zoo since 1986 and none of wood horsetail *Equisetum sylvaticum* in Ken Wood since 1984 — who can improve on this? A draft *Nature conservation in Hammersmith & Fulham* was circulated in March 1993; its account of Kensal Green Cemetery draws heavily on John Latham's papers in this journal. An interesting find by the LEU's surveyors is salad burnet *Sanguisorba minor* subsp. *minor* in the cutting of the West London Railway where it forms the borough boundary near the Earl's Court Exhibition Centre.

Many members already mentioned under other vice-counties supplied Middlesex records. Mrs Norman found a single plant of henbane in Hampton Court Park, and on the adjoining towpath, in addition to well-known rarities, saw two plants of *Cotoneaster obtusus* named for her by Mr Page, and large trees of alder buckthorn *Frangula alnus* and pear *Pyrus communis* rooted in the stonework where they could hardly have been planted. Mr Palmer found bifid hempnettle *Galeopsis bifida* in raised flower-beds in front of Victoria Station, Indian pokeweed *Phytolacca acinosa* on a roadside in Bayswater and *Coleus blumei* as a car-park weed in Belgravia, scattered among garden pink-sorrel *Oxalis latifolia.* I was able to confirm the presence of *Moenchia erecta* in Hampton Court Park. Mr Hounsome's Middlesex records include small patches of common bistort *Persicaria bistorta* in two flower beds at Alexandra Palace, confirmed by Mr Bevan, five patches of glaucous sedge *Carex flacca* on a small area of waste land by a tennis court at Muswell Hill, a clump of purple moor-grass *Molinia caerulea* in Highgate Wood and two or three plants of the hoop-petticoat daffodil *Narcissus bulbocodium* on waste ground near Friern Barnet sewage works. Last year (Burton 1992: 179) I wrongly placed this locality in v.c. 20. Dr Griffith saw a large group of bugloss *Anchusa arvensis* in a car-park at Whetstone, where it was later sprayed with herbicide. Her survey of a corner of Mill Hill Park proposed as a 'wildflower meadow' and 'bird's larder' (conflicting objectives?) produced records of some uncommon weeds. Mr Vaughan and Mr Ellison's 1992 records include rather few from v.c. 21, but both mention hoary mustard *Hirschfeldia incana* which is evidently increasing in north and north-west London suburbs. Mr Johnson reports that there is still a small clump of toothwort *Lathraea squamaria* in Springwell Lane, in spite of earlier reports that it had not survived the felling of dead elms in the mid-1980s, and rusty-back fern on lock walls at Harefield. He reports two colonies of *Alopecurus aequalis* in the moat at Down Barns, and broad-leave helleborine *Epipactis helleborine,* spurge laurel *Daphne laureola* and few-flowered garlic *Allium paradoxum* in the grounds of a day centre at Harrow Weald.

Mr Bevan himself continued to make many good discoveries in north London, adding to those he reported in his last presidential address (Bevan 1992). He found *Veronica peregrina* in a herbaceous border in Broomfield Park and blue fleabane *Erigeron acer* in Finsbury Park. In Queen's Wood there were scattered trees of the recently described *Sorbus croceocarpa* and a single plant of wall lettuce *Mycelis muralis.* The plant of perfoliate alexanders *Smyrnium perfoliatum* in Highgate Wood was found earlier by Ken Adams, and at Alexandra Palace Mr Bevan identified imperforate St John's-wort *Hypericum maculatum* for George Newbigging. On Parkland Walk there was a small colony of wild golden-rod *Solidago virgaurea,* extending the slight recovery already being enjoyed by this species in north London, and a single crown of lady fern *Athyrium filix-femina.* However the population of knotted clover *Trifolium striatum* reported here last year turns out to be a mis-identification of hare'sfoot clover *T. arvense*. Mr Bevan was of course at our meeting on 27 September which found a large patch of Hungarian brome and three plants of a hawkweed *Hieracium vagum* at Railway Fields and parrot's-feather *Myriophyllum aquaticum* in the Middlesex Filter Beds near the Lea. On the Middlesex side of the Darlands Lake Nature Reserve (see above under Herts.), our meeting of 26 July saw soft shield-fern *Polystichum setiferum* where it had been discovered in April by Howard Matthews. Mr Matthews himself produced a detailed analysis of the distribution of ferns on railway bridges in the Ruislip and District Natural History Society area.

The Harrow Natural History Society is another with several botanically active members, and Elizabeth Dowley supplies an annual list of their new finds. In 1991 and 1992 Dorothy Thompson figures in the list as finder of fine-leaved sandwort *Minuartia hybrida* at Harrow Weald. This is an extremely rare species in London and it would be useful to have much fuller details of this occurrence, but there are evident difficulties collecting secondhand data.

Leslie Williams's researches in Fryent Country Park are well known, having resulted in publications in this journal. As the area is divided into quite small named fields, records from it can be localized very exactly. In 1992 these included *Hypericum maculatum* which is thought to have appeared subsequent to the disturbance caused by the occupation of 'travellers' from 1986 to 1990, and single plants of *Hyoscyamus niger* and California brome *Ceratochloa carinata* on mounds created to prevent them coming back.

Elinor Wiltshire found a single plant of *Cotula coronopifolia* in a 'squishy area around a pond among rank vegetation near Denham in v.c. 21'. Mrs Wiltshire gives a reference to a one-kilometre map square. In this area, which has repeatedly been altered by gravel workings, precise map reading can be difficult and this degree of accuracy can be acceptable. It is extraordinary that this alien, already mentioned under Surrey, should be found in London twice in the same year by people able to recognize it. I think it unlikely that there is much more of it around waiting to be discovered.

The only 1992 records seen from that part of v.c. 21 which is now in Surrey are those mentioned in the *LNHS Newsletter* account of the meeting of our South-West Middlesex Section to Staines Moor Conservation Area on 13 September. *Echium vulgare* and *Erigeron acer* are among the plants mentioned, indicating that this area has been taken from the site of former gravel workings or other disturbance rather than the grazing marsh of the actual Moor, much of which has been replaced by the M25 motorway.

V.C. 24, Bucks.

Mr Ellison found loose silky-bent *Apera spica-venti* on a recently seeded verge at Denham. Four of Mr Matthews's railway bridges are west of the Colne, with a flora including two spleenworts *Asplenium adiantum-nigrum* and *A. trichomanes*.

Localization of records

In the foregoing paragraphs I have commented many times on the precision with which individual members have localized the very numerous records submitted. I am well aware of, and grateful for, the considerable effort required to put data onto paper, and it certainly seems to be worth discussing what quality of data is adequate. As in other contexts where quality is the topic, the crucial issue is the use to which the data will be put. I see two main likely uses for localized plant records, the collection of distributional information, which is likely to be presented in the form of a map, and the creation of an information source which might allow the plant to be refound, without reliance on the memory of the individual finder.

The maps of plant distribution in the London Area which the LNHS has produced to date have used the tetrad, a square of area 4 km^2, as the unit for plotting records. This has allowed us to publish maps of our area, which is 64 km across, on the small page size of this journal or in double-column on a larger page size as in the *Flora of the London area* (Burton 1983), using simple technology. Many members still supply records localized to a tetrad, and for the very common species data on the detailed distribution of which are never likely to be called for, this precision level is adequate. For uncommon species, it is technically possible to plot records onto a map more exactly, with the potential of showing the presence of a species in a number of localities in the same tetrad, of minimizing the significance of the proximity of a locality to the tetrad boundary, and so on. Therefore it is desirable that records of them should be localised to a one-km square, or better still with a six-figure grid reference, localizing the site to within 100 metres. It should not be thought that a full map reference alone will always be sufficient; a brief indication of the place by name provides a useful check that the figures are in the correct sequence.

Detail sufficient to refind the plant is only worth supplying if it is likely still to be there in subsequent years. Casual aliens and chance hybrids may be worth keeping statistical records of, but they cannot be expected to persist in one spot from year to year. For plants where this is a reasonable expectation, a numerical map reference is not always the most useful data for the purpose. In open grassland or in woods, it may be difficult to judge one's position with mathematical accuracy, but possible to state it precisely in terms of distance from or along a well-used path or a boundary. I recall having found a rare alpine on a Scottish cliff by following an instruction to keep two conspicuous boulders below exactly in line. On occasions when significant discoveries are made in urban locations, street names and house numbers will give a much better indication than a six-figure grid reference, which refers to an area of 10,000 m^2.

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Book review

The tree book. The indispensable guide to tree facts, crafts and lore. J. Edward Milner. Collins & Brown, London. 1992. 192 pp. £16.99 hardback, ISBN 85585 132 6, £10.99 paperback, ISBN 85585 147 4.

Edward Milner is best known to the LNHS as our esteemed spider recorder. His regular papers in *The London Naturalist,* and entertaining contributions to the Society's *Newsletter* have introduced many of us to the unfamiliar world of arachnology. In the book under review Mr Milner reveals to us one of his other great interests — trees.

The tree book was published to accompany the television series 'Spirit of Trees', which Edward produced and directed, and which was transmitted in the autumn of 1992. The idea for both the television series and the book came in the aftermath of the Great Storm of October 1987, when millions of trees were blown down across southern England. This dramatic event triggered a remarkable response and showed the depth of feeling people have towards trees, and their eagerness to learn more about them. Dissatisfied with the narrow range of most easily available books about trees, and their concentration on identification, silviculture and forestry, the author set about compiling the material that has resulted in the current book and the TV series. As he acknowledges in the preface, he has 'picked the brains' of a wide range of tree experts, and several of these have contributed essays on their own particular subjects. I found these particularly useful in providing succinct accounts of recent research not easily available elsewhere.

The book is divided into three parts and the first focuses on the natural history of our own native trees. An account is given of each species with an emphasis on its ecology, folklore, and traditional uses. This is followed by a description of their post-glacial history, which includes an excellent résumé of Prof. H. J. B. Birks's definitive work based on pollen analysis. A chapter on 'Ancient Trees' looks at the work of Donald Piggott on lime and Allen Meredith on yew trees. Donald Piggott also contributes a chapter on 'Tree Regeneration and Predation'. The final part of this section concludes with a chapter on traditional management of trees, which includes the work of Walter Lloyd and Bill Hogarth, two modern-day practitioners of the art of coppicing, who feature so successfully in the TV series.

In part two, 'Trees and the Earth', the net is thrown wider, with an account of the essential role trees play in the global ecosystem. George Peterken writes an account of 'Trees as Habitats', and Prof. Phillip Grime introduces us to the varied 'Ecological Strategies of Trees', a subject that he has pioneered. A chapter on 'Record Trees' describes the ancient bristlecone pines (our oldest living trees) and the Californian giant redwoods, the world's largest trees. A detailed account of the discovery of 'The Living Fossil Tree' or dawn redwood *Metasequoia glyptostroboides,* now a feature of many suburban streets, is followed by a discussion of 'Socotra's Strange Trees', the remarkable endemic flora of an island off the Horn of Africa. This section concludes with a chapter devoted to the 'Folklore of Trees' and another on the 'Inspiration of Trees', with extracts from Henry Thoreau's evocative writing.

In the final part of the book, entitled 'The Future of Trees', Oliver Rackham contributes a characteristically forthright criticism of current tree-planting policy and suggests a more rational approach to 'Planting Amenity Trees'. Dr Peterken and George Soutar offer advice on planting 'Native Trees and Shrubs for Nature Conservation' and, given the enthusiasm with which some local authorities are currently planting trees, give a timely warning of the dangers of siting them in inappropriate places. Their contribution includes a useful table and accompanying map which show the suitability of different areas of Britain for the planting of specific native trees. Alan Mitchell then gives a strongly argued 'Rationale for the Planting of Exotic Trees'. Conservationists generally undervalue such introductions, referring to them disparagingly as 'aliens'. Yet, particularly in the urban context, exotic species can play an enormously important role in nature conservation, providing, for example, nesting sites and food for a wide variety of birds.

The book is illustrated throughout with both colour and monochrome photographs. The colour photographs are of a consistently high quality, and the work of Alan Watson, energetic director of the Findhorn Foundation, is particularly striking. One or two of the smaller black-and-white photographs are less successful (the picture of 'Infant Birch Seedlings' on p.16 being particularly difficult to interpret). There are also a number of attractive drawings which were specially commissioned to illustrate the early life stages of our native trees. Unfortunately two of these are mislabelled. A few minor errors have also crept into the main body of the text (hornbeam, for example, is not limited to the south-west of England (p.53): hawthorn does not belong to the genus *Sorbus* (p.66): and the small-leaved lime has a confusing double entry in the table on p.157). But these are very minor quibbles and hardly detract from the general excellence of the book. There is a useful reference section at the end which includes a diary of tree events, a directory of tree organizations and a list of specialist suppliers of native trees and seeds.

The book concludes with a plea to conserve our diminishing arboreal inheritance with a saying from Papua New Guinea, which we would do well to remember; 'Our forests are a gift from our ancestors which must be passed on to our children'.

I can highly recommend this book to all who love trees and would like to learn more about them.

David Bevan

Obituaries

BRUCE CAMPBELL, PH.D., O.B.E., M.B.O.U., 1912–1993

With the death of Dr Bruce Campbell at Witney, Oxfordshire on the 9 January 1993, the London Natural History Society has lost a respected honorary vice-president, and the world of ornithology a leading exponent of field techniques and communication.

I first met Bruce when he came to address the Ornithological Section of the Society in, I think, 1952. I was asked to propose the vote of thanks on this occasion and we chatted afterwards. A year later I was lucky enough to join him as assistant secretary at the British Trust for Ornithology's then tiny headquarters at 2 King Edward Street, Oxford, where he had been secretary since 1948.

Working closely with him from 1953 until 1956, when I left to read zoology at Oxford University, I soon came to admire his enthusiasm and charisma and, above all, his great kindness and humour. The rapid development of the BTO in those early postwar years owed much to the tremendous energy with which he built up its membership and nationwide organization from a small base, and thus laid the foundations for the large and highly respected, professionally led amateur scientific organization that it is today.

In April 1959 he was invited to head the BBC's Natural History Unit at Broadcasting House in Bristol as senior producer on a three-year contract, with the particular task of firmly establishing its reputation, not only with the growing television audience and the then still very substantial radio audience for wildlife programmes, but also with the scientific world, whose co-operation was becoming evermore important in contributing to the success of the Natural History Unit's gradually extending range of programme subjects. As a long-established radio and television broadcaster and presenter there was nobody better suited to this formidable task. Bruce, it is true, lacked production experience when he arrived in Bristol; but he soon mastered this by producing the then weekly, long-running and renowned 'Naturalist' series. Not long after attending a six-week television production crash course in 1959 at the Television Centre at Wood Lane, Shepherd's Bush, London, he was also embarking on the production of TV programmes, including a series of his own, with Prof. Emlyn Evans and Tom Salmon, on geology. Television production is primarily a young person's province, and coming into it rather late in life, Bruce, characteristically, always appreciated and acknowledged the friendly support he received from his enthusiastic colleagues and back-up teams at Broadcasting House, Bristol. He admitted that he found his curiosity in things technical did not quite match theirs, an attitude of mind which I both sympathized with and shared when I eventually joined him and the Natural History Unit at Bristol in 1960.

In his Bristol years from 1959 to 1962, Bruce spent most weekday nights at a small hotel close to Broadcasting House, commuting at the weekends to and from his delightful sixteenth-century Cotswold stone farmhouse at Hordley, near Woodstock, which he had occupied since his earliest BTO days at Oxford. Once again I was able to share local bird-watching excursions with him, as I had in the 1950s in the Oxfordshire countryside. He introduced me to the ornithological Meccas of the Bristol area, such as Chew Valley Lake, Blagdon and Cheddar Reservoirs, and the beautiful Gordano Valley. I, in turn, with J. M. Chalmers-Hunt, introduced him to the North Downs within the LNHS area where, on slopes above Shoreham, Kent, on 24 June 1961 he produced what was, I believe, the prototype of the genuine radio nature trail type of programme, made in the field by recording events on a portable Nagra IIID tape recorder as they happened. This was broadcast in the BBC's radio series

Dr Bruce Campbell in his garden at Hordley, near Woodstock, Oxfordshire, 1956.
Photo and copyright John F. Burton.

'The Naturalist' under the title of 'Butterflies of the Chalk and Limestone'. Michael Chalmers-Hunt and Walter Murray were the chief contributors. After one of the recording sessions at Badger's Mount (now, sadly, along with its once flourishing population of silver-studded blue butterflies, destroyed by coniferization and the construction of the M25 motorway), I proudly showed Bruce a tree pipit's nest with six young I had found; he immediately upstaged me by finding two whitethroats' nests and a linnet's, all with eggs, in the space of 25 minutes.

Bruce Campbell's nest-finding skill was legendary. Dr David Snow recalls a day in the Forest of Dean in the 1950s, when Bruce discovered, in perhaps 40 minutes, two or three nests each of blackcap, garden warbler and wood warbler; all located by casually tapping the vegetation with his stick and poking about. I have many similar memories: one that instantly comes to mind followed a lunch we had with the chief forester of the Forest of Dean in his house in the forest. During the meal, the forester had mentioned how he had consistently failed to find the nest of a pair of bullfinches which clearly had one somewhere in the garden. As we made our farewells, and walked out through the front porch, Bruce walked straight up to a nearby evergreen bush, a box, I think, parted it with his hands, and there was the nest! As we drove back towards Oxford along one of the forest lanes, Bruce capped his achievement that day, by spotting a robin's nest in the nearside bank while at the wheel.

Born in Southsea, near Portsmouth, on 15 June 1912 (being at heart a Scot, he did not care to admit to an English birthplace, especially one so far south!), Bruce originally learned his nest-finding skills in a boyhood spent mainly in Hampshire and Argyllshire in the early years of the century, when egg-collecting was considered a respectable aspect of ornithology. They were acquired early from his father, Ronald Bruce Campbell, who rose to become the Army's inspector of physical education, and other relatives; and shared with contemporaries at Winchester College, where he was a scholar. It was at Winchester that he attended a lecture on the Oxford expedition to Greenland by the climber and explorer Tom Longstaff who showed them maps of the breeding territories of passerines prepared by Max Nicholson, one of our honorary vice-presidents. At that date this was pioneering work, and it made Bruce realize, as he wrote in his autobiography *Birdwatcher at large* (Dent, London 1979), 'that there was something you could do with nests other than emptying them'. This eventually led, following the acquisition of a degree in forestry at Edinburgh University, to a detailed investigation of the effects of industrialization on the bird populations of farmland in south Wales, which, written up as a PhD thesis, resulted in him being awarded the first-ever doctorate for ornithological fieldwork in Britain. Remarkably, Bruce carried out this research from 1942 to 1947 (he was exempted from military service during the war) while working full-time for the Central Council for Recreative Physical Training, which he joined in May 1937, from a base in Cardiff.

Through meeting James Fisher, Bruce Campbell became a member of the British Trust for Ornithology in 1943, and was persuaded by Fisher to become a local organizer for his national census of rookeries. In subsequent years he was invited by James to write the natural history section of the New Naturalist book *Snowdonia* (Collins, London 1949). He soon became well known to other leading lights in the ornithological scene of the 1940s, especially as a result of an exciting, though unsuccessful, attempt in 1947 to make an aerial census from an RAF Sunderland flying boat of almost the entire British population of grey seal pups produced that year. The census was organized by James Fisher, and also on board at various times, besides Bruce, were Ronald Lockley, Stephen Potter, Eric Hosking, Jack Davies and Frank Fraser Darling.

Next summer, Bruce was invited by Max Nicholson, the then chairman of the rapidly expanding British Trust for Ornithology, and other honorary officials of the Trust, to become its first full-time secretary. On 1 October 1948 he began work at the BTO's then tiny office in Oxford. With his characteristically infectious enthusiasm and dynamism he travelled throughout the British Isles to speak about the BTO and its work at societies such as ours, persuading amateur ornithologists that they could all make useful contributions to the Trust's scientific work, such as bird-ringing, the national census of heronries, the nest record scheme and various other enquiries, censuses and surveys. He built up its regional organization and, by the time he resigned to join the BBC in 1959, he had virtually doubled the BTO's membership. With his great interest in people he got to know many of the BTO members, numbering about 3,500 in 1954, remarkably intimately. Consequently, when I joined him at Oxford in 1953 and took over much of the role of speaking about the Trust at joint BTO-local natural history/ornithological society meetings, he was able to brief me extremely well about the leading local personalities and their specialities and personal backgrounds, thus ensuring that I said the right things.

Being a great communicator, Bruce Campbell had long enjoyed broadcasting in radio and television programmes about his enthusiasm for birds and wildlife in general (his interests were not confined to birds), and by the time he became secretary of the BTO, he was fast becoming a regular broadcaster on the BBC. There can be little doubt that, with his famous contemporaries, he did much to inspire a wide interest in natural history in the British public. So it was no surprise when this was recognized by the BBC and, as already mentioned, he was invited to take charge of its Natural History Unit. He succeeded admirably in raising the Unit's status, both within and without the BBC, but at the end of his three-year contract he felt that the growing competitiveness and technical complexity of television and radio production would not continue to give him the personal satisfaction he desired.

Following his departure from the BBC in 1962 he continued to broadcast for many years as a freelance, while, at the same time, being able to concentrate on his natural history writings and ornithological fieldwork, such as his long-term study of pied flycatchers at Nagshead in the Forest of Dean. Moreover, an invitation from his old school friend, Sir John Cripps, who edited *The Countryman* at nearby Burford, to become natural history adviser to the magazine, enabled him and his wife to maintain their highly convenient base near Oxford. Apart from this part-time position and broadcasting, he found time to write several books and much else, including the authoritative *A dictionary of birds* (BOU/Poyser 1985), which he edited with Elizabeth Lack. He also contributed wildlife columns to such newspapers as the London *Evening News* and the *Oxford Mail*. His exceptional nest-finding expertise found expression in his book *Finding nests* (Collins, London 1953), which he later revised with James Ferguson-Lees under the new title *A field guide to birds' nests* (Constable, London 1972). I still make considerable use of his *Oxford book of birds* (Oxford University Press 1964) and regard it as one of the best colour-illustrated accounts of British birds published since the Second World War; its concise, but informative text being quite masterly.

A polished writer and speaker, Bruce Campbell had his own special brand of humour which surfaced in much of his writing, notably in his highly readable autobiography and especially in his famous piece *à la* Stephen Potter on Birdsmanship. Originally published in 1951 in the RSPB magazine, *Bird Notes,* it has been reprinted several times in other journals and books, including Potter's book *Oneupmanship.* He occasionally also produced BBC radio programmes in the same light vein, such as the 'Natural History of the Haggis', and one on the hoodwink bird. Many spoken flashes of his humour, some of it reminiscent of the public schoolboy-type, remain pleasurably in my mind today.

Bruce had strong sporting instincts throughout his life, having boxed, fenced (his wife Margaret was his fencing partner at Edinburgh University) and played

Rugby in his youth. On my first day on the BTO staff at Oxford in October 1953, he shut-up shop for the afternoon and we all went to Iffley Road to see Oxford University's Rugby XV defeat the All Blacks! Ornithology was for him, as he often said, also largely a sport, although he enjoyed its scientific facets and reaped great satisfaction from his detailed study of, for instance, the Nagshead pied flycatchers.

Bruce Campbell was one of the most compassionate men I have ever met: he went out of his way to help people who were experiencing difficulties and problems. Personally, I owe him a lot for the help he gave me over many years. He had a special interest in and affinity for the welfare of young people and gave a lot of his time to, for example, the National Association of Boys' Clubs, youthful naturalists, and children in his local community in the Oxfordshire parish of Wootton, almost to the last. He also found time to be active in his local church and parish affairs.

Although his Oxfordshire base prevented Bruce Campbell from being a fully active member of the LNHS, he gave lectures at the Society's meetings on several occasions, sometimes contributed notes to the *London Bird Report,* and was very involved in arranging our special programme of six lectures on 'Aspects of Conservation' for European Conservation Year in 1970. The first of these lectures, entitled 'The Road to 1970', was given by Bruce, and in it he traced the history of the conservation movement from its earliest beginnings to the present time. He maintained strong links with such prominent officers of the Society as Stanley Cramp, Richard Fitter, E. R. (John) Parrinder and R. C. (Dick) Homes; especially with the last named when chairman of the BTO. He was appointed an honorary vice-president of the LNHS in 1971. Bruce received several other honours: he was awarded the Union Medal by the British Ornithologists' Union, the BTO Bernard Tucker and Jubilee Medals, and, for his conservation work as chairman of the Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust, he was awarded an OBE.

These awards to a man who imparted through personal contact, through broadcasting and through his writing, his love for, and wide knowledge of, the natural world and the countryside to successive generations of committed naturalists, and to the British public at large, were fully deserved. Beginning in the early years of this century, when egg-collecting (in which he indulged until early manhood) was still a respected branch of ornithology, he came to typify the conservation-minded, scientifically orientated ornithologists and naturalists of the present day. He was, above all, a warm-hearted, very humane man, and is already sorely missed by all who knew him. He is survived by his wife Margaret, and his sons, David and Robert, and daughter, Ròna, and their families, to whom we extend our deepest sympathy.

JOHN F. BURTON

EILEEN DOROTHY PARRINDER, 1912–1992

Eileen Parrinder, widow of John (E.R.) Parrinder, died in early November 1992 in the presence of her family in her lovely home overlooking the Cley Marshes in Norfolk.

It cannot be said that Eileen was well known in LNHS circles, but her involvement in ornithological recording, with John, in the London Area, restricted as it was because of family commitments in the years after the war, was considerable. Bearing in mind the extent of John's participation and influence in Society affairs, the part she played was of considerable importance. The initial benefit she bestowed was that she fostered in John a previously non-existent interest in birds. Throughout their marriage she encouraged, advised, and supported his involvement, not only in LNHS counsels, but also in activities such as the Society's Starling Enquiry and recording for *The Birds of the London Area since 1900,* as well as Dungeness Bird Observatory, even though such activities took John away from domestic duties. Self-effacing, it is more than probable that the covert influence she exercised was to her liking and greater than that of many whose names are much better known. To the end she supported the Society and particularly in practical terms, Dungeness, which was probably her first love.

On the national scene she will be remembered for the immense amount of work she put in, first with John, but latterly on her own, in recording and reporting on the spread of the little ringed plover in this country.

Eileen Parrinder was a dedicated conservationist and an immensely kind and caring friend who will be much missed by her many friends here and overseas.

John Crudass

Book review

List of vascular plants of the British Isles. D. H. Kent. Botanical Society of the British Isles, London, 1992. 384 pp. £11.50. ISBN 0 90115 821 6.

This is the publication which it was intended should be published at the same time as Stace's *New flora of the British Isles,* reviewed here a year ago, but the two works suffered independent histories of delays. However the close co-ordination of their contents has survived, and only one plant does not have the same name in both works. A note on the title-page of this one says that it was 'prepared from the BSBI database (Leicester)', which gives no indication of the amount of work put into it by Mr Kent. Whereas Stace's work is all about the correct identification of plants, this is about the correctness of the names used for them. These depend on opinion about the distinctness of genera and species, and on the application of the International Code of Botanical Nomenclature. The former criterion requires well-founded judgement, the latter, research into the validity, and sometimes the publication date, of the available names. Names have only been entered into the database as a result of Mr Kent's work verifying them. Ideally the published list should have included bibliographical citations, but this would have further delayed its appearance. Without citations, the reasons for selecting some of the less familiar names will remain obscure.

The obvious comparison to be made is with J. E. Dandy's *List of British vascular plants* published in 1958. Mr Kent includes many more naturalized aliens than Dandy did. However, formerly naturalized plants, which can no longer be found here, such as *Bupleurum rotundifolium,* are excluded, whereas the few long-extinct native species like *Carex davalliana* are still counted. Many of the excluded species are still represented in herbaria which users may expect to see rearranged to match the new list, and it will be a shame to have to take them out of their proper place in the sequence. For deciding which hybrids to include, Mr Kent has the advantage of being able to refer to the 1975 compilation *Hybridization and the flora of the British Isles,* which revealed the tenuous justification for many of the claims of unusual hybrids as British. An important practical difference between Dandy and Kent is in the style of numbering the accepted taxa. Dandy had all genera in a single sequence, Kent starts each family from 1, which makes for long strings of digits. Whereas Dandy left hybrids unnumbered, Kent numbers them by combining the numbers of the parent species. This makes for odd situations when a garden hybrid occurs in the wild independently of its parents; *Hebe* × *franciscana,* for instance, is numbered 124/17/ell × spec. *Freesia* × *hybrida* is the one case where a hybrid has to be shown simply as No. 1 of its genus.

The freesia illustrates well the limited usefulness of this work. It tells us that the correct name is not after all *F. refracta,* but to find out why the plant has been included, one has to look at Stace's flora to know that it is naturalized in and by old bulbfields in Guernsey. If you then look in David McClintock's *The wild flowers of Guernsey* (1975) you will see that some plants 'may even persist in warm sandy soil, but there are very few such records'. Modern herbarium keepers and flora writers can hardly afford to be without the most up-to-date list of names, but field botanists and taxonomic researchers each need something different.

R. M. Burton

Book review

Larger moths of the London area. Colin W. Plant. London Natural History Society, London. 1993. xxii-292 pp., A4. £19.95. ISBN 0 901009 04 0.

The bulk of the book is taken up with detailed accounts of the distribution and occurrence of all the 715 species of larger moths ever recorded in the London Area. This 'London Area', the area within 20 miles of St Paul's Cathedral, covers all of vice-county 21 Middlesex, and parts of v.c.16 West Kent, v.c.17 Surrey, v.c.18 South Essex, v.c.19 North Essex, v.c.20 Hertfordshire and v.c.24 Buckinghamshire. This arbitrary area can make for problems in where records should be sent for those recording around the boundaries. For instance in West Kent there is an overlap area between the present county boundary and the LNHS recording boundary; records for Lewisham or Woolwich are clearly in the present London recording area, but records from places such as Swanscombe or Shoreham which are quite clearly in Kent have not always made their way to the London archives (or likewise to the Kent archives). However, that some records have not been trawled is of no importance as it would not be possible to obtain all records from every tetrad for moths as might be possible for some other groups.

There is a detailed account of each species covering status, distribution, category, abundance, voltinism and phenology, larval food plants and discussion. Under distribution, for each species regarded as resident at some time between 1 January 1980 to 31 December 1991 a tetrad distribution map is given and for each species not mapped then full details of all records are listed. It is pleasing to see that the tetrads in this book are defined in the alphabetic system as used by almost the rest of the British Isles and not by the 'unique' system as used in previous LNHS publications. A shame when quoting tetrads in the account on the red-belted clearwing that they are out by ten kilometres.

To the reviewer these distribution maps are the most interesting part of the book, most looking like a dartboard with random spots, many spots for common species, few for the scarce species. Many species are absent from the more built-up areas, but others such as the vapourer appear to be quite frequent there. Many species however show a quite distinct, often intriguing, pattern of distribution: for instance why should the speckled yellow, a common woodland species throughout most of Kent, be rare in the London portion of the county and completely absent from the Essex part of London? To help interpret these maps is a sheet of six transparent overlays which includes built-up areas, presence of chalk and woodland.

The author has devised ten categories to explain the status of the moths in the London Area, and some of these categories are further divided. It is here, and under the headings of abundance, voltinism and phenology plus the discussion, that the expertise and knowledge that Colin Plant has of moths comes to the fore. Littered throughout are little snippets of how to find or breed out elusive species, plus cautionary notes on all groups, or couplets where there are identification problems. Under the heading of the peach blossom the line 'A rather attractive moth — the kind hoped for when demonstrating moth-trapping to beginners', can only have been written by someone with much experience of moth trapping.

Under the heading of larval food plants it is refreshing to see that only those plants on which the larvae have actually been observed feeding upon in the London Area are given, although at times when discussing distribution, foodplants recorded elsewhere are mentioned and clearly stated as such. The names of the foodplants are on the whole up to date, but some such as *Ulmus campestris* and *Lotus uliginosus* have been superseded in D. H. Kent's 1992 *List of vascular plants of the British Isles.*

The whole of the species account is enlivened by some wonderful line illustrations of moths (one for each family) drawn by Rob Dyke, most of which really do capture the jizz of the species concerned.

An appendix in eight parts includes abbreviations used for authors names, a very useful checklist of moths by vice-county for the whole of the London Area, a table of the number of tetrads each resident species was recorded in from 1980 – 1991: the almost obligatory code of conduct for insect collectors, a very useful and thorough gazetteer with index to tetrads, details and print out of the overlays, a glossary, and finally some useful addresses in which, under conservation bodies, the Kent Trust for Nature Conservation is listed as the Kent Wildlife Trust with an address that is two years out of date. A pity that the same care was not taken here as has been taken with the rest of the book. The book finishes with an excellent index that includes both English and scientific names.

With some 1,379,000 records this is a very readable and scholarly work which includes mention of every moth previously recorded from the London Area. So for every lepidopterist living or collecting in Kent, Surrey, Essex, Hertfordshire, Middlesex or Buckinghamshire this is a must for your library, whilst at the same time every general natural historian living in the London Area should have a copy on their shelf.

Lepidopterists elsewhere should also think of obtaining their own copy, not only for the information about the moths of the London Area, but also for the general information and little hints and observations that can be put into use elsewhere. Not only is this book a complete guide to the larger moths of the London Area, but it is a perfect example of how to record and write-up the moths, or any other branch of our fauna, from elsewhere within the British Isles.

ERIC G. PHILP

London Natural History Society Income and Expenditure Account for the year ended 30 June 1992

1991 £	Income	£	£	£
	Income from members and supporters:			
9,167	Subscriptions		9,058	
477	Donations		337	
—	Bequests		6,995	
813	Tax recovered on covenanted subscriptions		793	
—	Tax recovered on bequest deposit		22	
10,457				17,205
1,096	**Sales:** Journals	2,187		
(266)	*Less:* Expenses	(309)		
			1,878	
44	Literature and surplus library stock		32	
23	Journal offprints		68	
307	*Flora of the London Area*	287		
(53)	*Less:* Expenses	(16)		
			271	
198	*Butterflies of the London Area*	267		
(52)	*Less:* Expenses	—		
			267	
413	Chipperfield Bequest		216	
1,710				2,732
	Income from investments and deposits:			
15,283	Stocks and shares		15,822	
3,941	Tax recoverable 1991–2	4,408		
815	1992–3	865		
			21,095	
562	Investment cash account		813	
571	Profit on sale of investments		6,514	
			28,422	
(3,544)	*Less:* Custodian's charges	(3,410)		
(244)	Other charges	(54)		
			(3,464)	
			24,958	
245	Charities deposit fund		112	
2	Bank deposit account		279	
17,631				25,349
29,798	**Total Income**			45,286
(24,755)	*Less:* **Expenditure**			(25,288)
5,043				19,998
(3,370)	*Less:* Provision for diminution in value of certain investments			(3,826)

1991 £	£	Expenditure	£	£
		Meeting costs, sectional and general expenditure:		
	2,063	Hire of halls and rooms	2,131	
	1,955	Lecturers' fees and expenses, sectional expenses etc.	1,212	
	164	Postage and telephone	277	
	181	Stationery	199	
	1,481	Services (auditors' fees, insurance, etc.)	1,790	
	700	Honoraria and expense allowances	791	
	611	Depreciation	779	
	228	Bank charges	250	
	—	Sundry	(32)	
7,383				7,397
		Publications		
		Printing and expenses:		
	6,621	*London Naturalist* **70**	7,058	
	3,500	*London Bird Report* **55**	3,542	
	10,121		10,600	
	1,064	*Programme*	1,124	
	2,408	*Bulletin* and *Newsletter*	1,980	
	2,442	Mailing	2,881	
16,035				16,585
761		Library		910
475		Publicity		100
101		Grants, including contributions to other organizations		296
£24,755		Total expenditure for the year		£25,288

Balance Sheet as at 30 June 1992

1991				
£	£		£	£
		Fixed assets acquired after 30 June 1985, excluding library books:		
	10,342	Computers, including ancillary equipment and initial programming costs	11,594	
	143	Library equipment	143	
	1,588	Other indoor equipment	1,588	
	413	Bat detectors	413	
	2,158	Bookham hut	2,158	
	14,644		15,896	
	(13,498)	*Less:* Depreciation	(14,277)	
1,146				1,619
	218,731	*Quoted investments* at cost	229,152	
	(10,704)	*Less:* Provision	(14,530)	
208,027				214,622
		(Market value £330,958 – 1991: £326,387)		
		Current assets		
		Funds at bank and on deposit;		
	12,832	National Westminster Bank PLC	22,064	
	2,750	Charities deposit fund	1,000	
	15,582		23,064	
	525	Cash in hand	411	
	136	Payments in advance and other debtors	142	
	2,920	Tax recoverable on investment income	865	
	—	Tax recoverable on bequest deposit	22	
	425	Stationery stocks	275	
19,588				24,779
		Less: Current liabilities		
	(3,531)	Custodian's charges	(3,410)	
	(25)	Contributions to bat boxes	(25)	
	(4,865)	General liabilities and accrued expenditure	(1,073)	
(8,421)				(4,508)
£220,340		Total net assets		£236,512
		Representing: *General Fund* (incorporating the Hindson and Castell Bequests)		
218,667		Balance at 30 June 1991		220,340
1,673		Surplus for the year		16,172
£220,340				£236,512

D. BEVAN President
M. J. WEST Treasurer
Dated: 23 November 1992

Report of the auditors to the members of the London Natural History Society

We have audited the financial statements in accordance with auditing standards.

In our opinion these statements give a true and fair view of the income and expenditure of the Society for the year ended 30 June 1992 and of its assets, liabilities and fund balances at that date.

4 London Wall Buildings
LONDON EC2M 5NT
23 November 1992

FRASER & RUSSELL
Chartered Accountants

Note to the accounts

Accounting policies

a) Subscriptions, which are collected on a calendar basis, continue to be brought in as received. No account is taken of subscriptions in arrears until received.

b) Investment income is credited to the Income and Expenditure Account together with the income tax credit receivable.

c) Provision is made for all material debtors, prepayments, creditors and accruals with the exception of subscription income (see note a above).

d) Depreciation is provided on fixed assets at rates calculated to write off the cost of each asset over its expected useful life as follows:–

Computer equipment	—	25%
Other equipment	—	20%

See also the Treasurer's notes on page 7.

Book reviews

The natural history and antiquities of Selborne. Gilbert White. First published in 1789.

Although *The natural history of Selborne* (to give its popular, shortened title), has been in print for over two hundred years, and has run to hundreds of editions worldwide, it is not surprising that as 1993 marks the bicentenary of the death of Gilbert White, we should see the launch of further impressions. Two of these have been received by *The London Naturalist* for review. They are both based on the third edition, published in 1813, which is considered to be one of the finest of the early editions.

The first of these to appear, and entitled *The natural history of Selborne,* **was published in April by Thames and Hudson** (ISBN 0 500 97409 8). It is a new impression, in revised format, of a 1981 edition, is priced at £12.95 and runs to 256 pages. It comprises the forty-four letters to Thomas Pennant and the forty-six letters to The Honourable Daines Barrington, together with an introduction by Dr June Chatfield, former curator of The Gilbert White Museum, and a preface by the compiler, Ronald Davidson-Houston. The whole is embellished with 124 colour illustrations reproduced from the hand-tinted engravings of Gilbert White's contemporaries and is a most attractive book. The sources of the illustrations are provided. However, it does not include the second half of White's work which deals with the parish history, or *Antiquities.*

The second volume that we have is a 588-page facsimile of the full 1813 edition of *The natural history and antiquities of Selborne,* and this **was published in September by The Ray Society** (ISBN 0 903874 24 5) in a limited edition of 1,000. It is printed on heavy, antique wove paper, has one coloured plate and one fold-out plate, and the edges are gilded. In addition to the letters to Thomas Pennant and Daines Barrington, it contains in full the *'Antiquities of Selborne, in the County of Southampton. To which are added The Naturalist's Calendar; Observations on Various Parts of Nature; and Poems. By the late Rev. Gilbert White, Formerly Fellow of Oriel College, Oxford.'* The foreword has been contributed by Professor Ghillean T. Prance, FRS, Director, Royal Botanic Gardens, Kew, whilst the detailed introduction is by Dr Paul G. M. Foster, FLS, a well-known authority on Gilbert White. This volume is obtainable from The Ray Society, c/o Intercept Ltd, P. O. Box 716, Andover, Hants SP10 1YG (0264 334748) at £40+5% p. & p., or from your bookseller (who will order from Intercept) at £40.

K. H. Hyatt

The birds of St Margaret's. Ian Hodgson. Published by the author, 110 Longfield Road, Dover, Kent CT17 9QP. [1992]. Octavo, 40 pp., limp card. £5 incl. p. & p. No ISBN.

By a hair's breadth St Margaret's in Kent is our closest parish to France. Extremes are always interesting, and this detailed account of the birds of our south-east corner inevitably has much that is worth reading. The parish encompasses a chalk cliff with undulating fields behind and, between the fields, partly wooded valleys. There are no freshwater habitats useful to bird life, nor any coastal mud or sand-flats. But the area frequently receives influxes of migrants, and we learn that especially in autumn these can be spectacular during the first two hours or so after dawn.

The book is not dated (it appeared in 1992) and the pages are not numbered, but the presentation is as good as many county bird reports and the text is better written. A brief introduction leads into the systematic list which is compiled from about twenty years of regular watching and scattered observations before that. Numerous line-drawing vignettes pleasantly break the monotony. In total 251 species are recorded, though many literally just as they have flown past. The list shows anew that almost anything can turn up anywhere and probably eventually does. Most amazing are the records of two great bustards in 1873 'shot together in very severe weather' and, staggeringly, of two more seen 'in cliff-top fields', 11 January 1970. Have you checked your back garden today?

Certain more regular species attract special interest in this part of the world, however, and the notes on them will be of lasting use in relation to a naturally changing avifauna. In the 1950s no one knew for certain if range extensions by fulmars along England's east and south coasts would, as it were, meet in the south-east corner. Well, they did of course and their arrival in St Margaret's is here detailed from their first prospecting in 1953 to their eventual breeding, completing one of the most relentless and best-documented range extensions of any bird. As a teenager, in 1960 at Dungeness I saw nearly the first shearwater ever to be seen live from the mainland of Kent, in fact the second Balearic for the county. Hence it is interesting now to see that 'movements' of sooties and Manxies off St Margaret's are so commonplace that they can be compared! Quail evidently continued a presence here long after they did in most areas, and in 1987 there were no fewer than 'nine calling birds' with seven heard on one evening — perhaps a county record in recent decades? Mediterranean gulls have tried to nest but abandoned. Black redstarts like them have their UK stronghold along this stretch of coast and are not hard to find. But for me the star bird at St Margaret's is the peregrine. At last it has returned to its former haunts here, and the book documents that it has been breeding in the Dover area again for several years. My family and I saw a massive female recently while picnicking at the foot of St Margaret's cliffs just yards from the car-park, patrolling up and down seemingly oblivious of human existence. What better reason for buying a guide-to-the-birds-of could there be?

PAUL CORNELIUS

Habitat management for invertebrates: a practical handbook. Peter Kirby. Produced by the UK Joint Nature Conservation Committee and National Power, and published by The Royal Society for the Protection of Birds. 1992. 150 pp. £11.50 post free from (and cheques payable to) RSPB, The Lodge, Sandy, Bedfordshire SG19 2DL. ISBN 0 903138 55 7.

Habitat conservation for insects: a neglected green issue. Edited by Reg Fry and David Lonsdale. Amateur Entomologists' Society. 1991. 257 pp., 32 colour plates. £12 post free from AES Publications, The Hawthorns, Frating Road, Colchester, Essex CO7 7JN. ISBN 0 900054 52 2.

The conservation of insects and their habitats. Edited by N. M. Collins and J. A. Thomas. 15th Symposium of the Royal Entomological Society of London. Academic Press. 1991. 450 pp. £37.50. ISBN 0 12 181370 3.

These three recent books provide some much-needed information on the conservation of insects and other invertebrates.

Habitat management for invertebrates is the first practical manual for site management for invertebrates. Prior to this the information was widely scattered or unavailable in print. The book covers a wide range of lowland habitats but does not deal specifically with uplands. It has been produced for nature reserve and other land managers and also for those with little experience in habitat management. The book draws on the experience of invertebrate specialists in research and conservation organizations and provides guidelines which take into account many vulnerable habitat features so important to invertebrates. The author worked for the Nature Conservancy Council (now English Nature) for five years, preparing county reviews of sites of invertebrate interest and national reviews of the rarer Hemiptera and minor insect orders. He has considerable experience of habitat survey, assessment and management, and is currently an ecological consultant in invertebrate conservation.

This well-produced book is copiously illustrated with over 200 black-and-white drawings and six photographs. Many of the detailed drawings depict some of the many invertebrates associated with certain habitats or plant species. There are sketches showing the growth stages in coppice and pollard cycles; of different kinds of dead wood, and of entomological traps used when recording. A series of designs shows layouts for woodland rides, paths, ponds and gravel pits within the relevant sections. Diagrams show management rotation schemes for grass cutting, scrub, woodedge, heather, heathland and ditches. This thick paperback book has a weatherproof cover and is A4 size. However, there are two columns of text to a page which makes it easy to read. Short, concise paragraphs contain all the salient facts with the more important statements in dark type. There are five chapters on major habitats: Woodlands, Grasslands, Lowland Heaths, Freshwater Wetlands, and Coastlands. There is an index at the front of each chapter giving the title and number of sections and subsections. For example: the index for section four in 'Freshwater Wetlands' reads — 4. Running water, 4.1 Seepages and springs, 4.2 Drainage ditches and 4.3 Rivers and streams. Various vegetation structures and habitat types are described together with the requirements of invertebrates using them, and different methods of management. The introductory chapter describes the special characteristics of invertebrates such as an annual life-cycle, no long-term resting stage, limited powers of dispersal and that, as they are cold-blooded, they are dependent upon an external source of heat. Many invertebrates have very precise habitat requirements which must be provided by their environment each and every year. There are about 30,000 macro-invertebrates in Britain, many of which are in serious decline and their needs are not always being met, even on nature reserves.

The importance of vegetation structure is a recurrent theme throughout the book. A mosaic of varying types of vegetation encourages a diversity of invertebrates needing different conditions. Woodland edges are excellent places providing there is a gradual transition (ecotone) from short sward to long grass, with flowers and isolated trees, patches of scrub and then woodland with dead wood. Many larvae need damp, shady places while the adults require sunnier, open sites for flying. An area of bare soil, which warms up relatively quickly, or a sunny bank, are essential for many invertebrates which need to bask in the sun or to initiate mating rituals. Many predatory insects, and also spiders, only hunt over bare ground while some solitary bees and wasps burrow into patches of bare soil to make their nests. A complex community of very small invertebrates may spend their lives within the sheltered microclimate of a grass tussock. Larger areas of unimproved grassland are likely to contain many refugia in neglected corners and hedgerows where invertebrates can remain unmolested.

Heathland is an important invertebrate habitat and our southern heaths support many invertebrates at the edge of their European range. Some heaths are rich in rare species. It is easy to associate heather with heathlands, but in the introduction to 'Lowland Heaths' it is stated that confusing heather management with heathland management gives quite the wrong emphasis for invertebrate conservation. Only a small number of invertebrates are dependent upon heather and to many of them it is only an architectural feature. For instance, the potter wasp *Eumenes coarctatus* builds a flask-shaped cell on heather branches, and some spiders, such as *Hypsosinga pygmaea,* attach their webs to it. The heather beetle *Lochmaea suturalis* feeds on the foliage and various bees forage at the flowers. However, a well-managed heathland with mixed vegetation supports a much richer invertebrate fauna.

A section on 'Standing Water' offers some intriguing features, often overlooked. Hoofprints and ruts, dry for part of the year, are temporary pools which are used by a considerable number of invertebrates. Many of these are common species capable of recolonizing new prints and ruts, even if the present stock dies out. However, less-common species may be lost. Temporary pools may support rare and interesting plants as well as invertebrates, and conservation may involve nothing more than keeping the pool the way it is. Although management of the surrounding land may be critical, some invertebrates, unable to cope with competition or predation in more permanent water, are confined to temporary pools. An example is the fairy shrimp *Chirocephalus diaphanus* whose eggs can survive dry periods. In permanent water it is eaten by fish.

Appendices give 'Sources and Repositories of Information on Invertebrates' which list recording schemes, record centres and societies; a user-friendly guide to 'Further Reading'; and more specialist texts under 'Invertebrate Identification Guides'. There are the usual lists of fauna and flora under their scientific or English names.

This book is packed with information and it was difficult to choose, from among the many fascinating items, those to mention here. All the key features for invertebrate habitat management are here, and this management manual is an important source of reference. It is very easy to read and the clearly laid-out sections and subtitles ensure quick access to specialized information. At a price most people can afford, it should be on the bookshelf of everyone interested in invertebrates and especially those who are involved with the management of wildlife sites.

Habitat conservation for insects: a neglected green issue provides an overall view of the habitat needs of insects. There are contributions from fifteen authors whose backgrounds include working for the Nature Conservancy Council (now English Nature), the Forestry Commission's Forestry Authority, The Institute of Terrestrial Ecology and several universities. There are ten chapters, six appendices and three indexes.

Early chapters explain how insect requirements are not adequately met by conservation methods for larger and more popular life-forms. Chapter 1 introduces the need for insect conservation due to habitat loss; the objectives for conservation and the intrinsic value of insects. As well as providing a pollinating service they make contributions to medical science, biological regulation and education. Chapter 2 gives the background information on insects and their conservation status and briefly explains the classification system. It gives examples of the better-known orders of insects, their types of life-cycle and the kind of habitat they require. Chapters 3 and 4 discuss woods: deciduous, conifer, high forest, dead-wood, wood-pasture, coppice and woodland edge. The last is a valuable invertebrate habitat now largely lost. The number of species of insects that depend upon woodland is immense and examples are given together with management practices.

Chapters 5 to 9 are concerned with grassland, grazing regimes and re-creation of herb-rich sward; hedgerows and arable field margins and their value for insects; heath, moorland and mountain; aquatic and water margin habitats; the integration of wildlife habitats with other land use, and problems of insect conservation. Chapter 10 covers organisations and legislation concerned with conservation; the need for recording schemes and a 'code for collecting' in relation to conservation. Also, how to deal with planning applications and enquiries. The appendices give additional information on codes for collecting and re-establishment, food-plants, butterflies, aquatic insects and wildlife and countryside laws in the United Kingdom. References, reading lists and identification guides are placed at the end of relevant chapters.

The scale of insect decline in Britain is illustrated by examples taken from some of the better-known insect groups. A key theme throughout the book is the need for proper objectives for nature conservation as a whole and it outlines principles and practices of management. It explains the ecological importance of insects and that conservation of even small local sites will be of benefit to some of them. The book took several years to develop and produce and it contains the combined knowledge of years of experience of many field-workers, both amateur and professional. It is well constructed and thought provoking and clearly reflects the deep interest its contributors' have for their subjects. This excellent book fills a gap in the market and is highly recommended.

The conservation of insects and their habitats contains 15 papers which were presented at the 15th Symposium of the Royal Entomological Society. Speakers came from Australia, Brazil, Finland, Great Britain, Italy, New Zealand, Switzerland and the United States of America. There is an index of the contents at the front of each paper. References at the end of each paper provide, in total, an extensive bibliography to the subject. Aspects of insects conservation, including some case-studies are given for woods, wetlands, grasslands, farmland and tropical forests. There are two papers on groups: Lepidoptera and arthropods. The effect of island isolation on insect populations was the subject of two other papers: one on islands, large and small, in the world's oceans; and two, on islands of suitable insect habitat within the wider and more inhospitable countryside. Services and goods from insects provided an intriguing subject. Obvious services such as pollination and decomposition, and also insects used as monitors of change and as biological pest controls. Goods included honey, beeswax, cochineal, gums and silk. The trade in live and dead insects, and insects as part of the human diet are discussed. The last chapter gives short details of eight poster presentations.

In recent years there has been growing international concern over the decline in insect species and the conservation topics throughout the book are often related to world strategy. Insect conservation faces huge problems which mostly lie within the political and economic sectors. This book cannot be read without realizing the importance of our insect fauna. To quote '...[insects] underpin the stability of [biological] communities by their genetic diversity and their complex web of ecological interactions...It is time to realize that insects, in common with other life forms, are neither inexhaustible nor indestructible'. And time is not on our side.

The papers in this book are based on research and current thinking on insect conservation at an academic level. The approach to conservation problems is on a continental scale as well as on ecosystems. This is a book for those who wish to broaden their knowledge of some of the insect conservation issues on the planet.

Shirley Goodwin

Plant galls. M. Redfern and R. R. Askew. Naturalists' Handbooks 17. Richmond Publishing Co., Slough. 1992. 99 pp + 4 colour plates. £16 hardback, £8.95 paperback. ISBN 0 85546 286 8 (hbk), 0 85546 285 X (pbk).

This series of booklets aims 'to provide what an investigator needs to make novel discoveries about local plants and animals — a clear introduction to what is already known about the natural history of each group, highlighting topics on which further research is needed...'.

In essence, this book falls into three sections. A brief introduction precedes two chapters summarizing what is known of the biology of a representative range of gall-causing agents and a discussion of the communities of parasites, parasitoids and inquilines associated with the gall causers and their abodes. There follows a section of 14 keys, all bar two being to genera of plants. This covers many of the more frequently encountered galls. The final section discusses (all too briefly) a range of research techniques. There are five pages of references.

Since so many gall causers are dipterous or hymenopterous it is perhaps not surprising that neither of the authors appears to be a lepidopterist. The main failings this leads to is the omission of *Lampronia fuscatella* from the key to galls on birch twigs, and the clearwing moths *Synanthedon flaviventris* and *S. formicaeformis* from sallow, plus *Paranthrene tabaniformis* from aspen. Readers wishing to identify pryalid moths are referred to Beirne (1952) — long out of print and virtually unobtainable secondhand — rather than Goater (1986) which is still in print, up to date and better for the task. Another idiosyncrasy is using Kloet and Hincks (1972) for Lepidoptera names when there have been two editions of Bradley and Fletcher (1979, 1986) since. The authors appear to be aware of this as they provide on page 81 the current generic name *Phycitodes* as a synonym in the only instance where the works quoted differ on the moths discussed. A proof-reading slip on page 83 leaves *brockella* spelt with only one *l*, but this should not cause any confusion.

Despite the criticisms, a strong feature of the book is the selected keys. The range of plant genera covered is limited so this in no way replaces the key by Stubbs (1986). However the book updates these keys in some useful respects. For example, it includes the galls on birch seeds. These were omitted by Stubbs, but described in subsequent issues of the British Plant Galls Society's journal *Cecidology*. The drawings in the margin are most helpful.

In many ways, the book falls between two stools. It is neither a complete key nor does it cover even the basic biology of all the galls it keys. The series claims to put its readers at the forefront of current research. This is a bold claim for such a slim volume. Perceived facts are stated without any hint of the basis for those conclusions. However, it is not entirely without substance for anyone able to follow up the references.

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IAN D. FERGUSON

Insects on cabbages and oilseed rape. W. D. J. Kirk. Naturalists' Handbooks 18. Richmond Publishing Co., Slough. 1992. 66 pp. £13 hardback, £7.95 paperback. ISBN 0 85546 288 4 (hbk), 0 85546 287 6 (pbk).

This is a suitable publication for the layman to follow, with lucid explanations of how the proximity of one plant to another affects the outcome of successful predation. It is an eye-opener for anyone who does not appreciate fully how seeds are germinated. The study of insect behaviour on plants, and in particular what parts are more attractive to different species, is fascinating to the amateur naturalist. Future food plans could depend on the type of research described in this excellent publication. Research-oriented readers are warned to take special care when handling the chemicals described for studying the various insects.

The coloured illustrations are of excellent quality, but the black-and-white drawings and their numbering are confusing as the reader needs frequently to be turning the pages to take advantage of the detail shown. I recommend this book as an addition to most naturalists' collections.

G. W. LOVELAND

Pollution monitoring with lichens. D. H. S. Richardson. Naturalists' Handbooks 19. Richmond Publishing Co., Slough. 1992. 76 pp. £13 hardback, £7.95 paperback. ISBN 0 85546 290 6 (hbk), 0 85546 289 2 (pbk).

Pollution can be very visible — oil slicks and rubbish; or it can be invisible — gases, metal particles and radioactivity, and because of this very invisibility it can be more worrying. We have to use indirect methods to perceive it, such as specially made machines, or use the adaptations of living organisms as an indication. This slim volume briefly introduces a complex topic — how do certain living organisms, in this case lichens, respond to their environment and what can we tell from this.

Lichens are a symbiotic relationship between fungi and algae or cyanobacteria, the former considered dominant, therefore taxonomy follows the fungal partner. Identification, in this book, is practiced on those lichens selected for a wall chart (Claire Dalby's charts are worth having just for their aesthetic appeal). If only they grew as such perfect specimens the amateur's life would be easier! It is however a useful introduction for beginners to forms, structures, and the use of keys (including the fact that your sample might not be in the key you are using), but it will be a big step to the use of the newly-published lichen flora. There is also a brief introduction to lichen natural history and the fauna associated with them, which can in themselves be useful indicators.

Other chapters cover those forms of pollution that our modern industrial society pumps into the air and saturates the soil with — the well-known acid rain with sulphur dioxide, ozone, nitrogen compounds and the topical (since Chernobyl) radioactivity.

The amateur lichenologist can do useful work on distribution, as has been shown by Irish schoolchildren, but some monitoring can only be 'measured by atomic absorption spectrometry, modern microprocessor-controlled polarography or inductively coupled plasma emission spectroscopy' to which they are unlikely to have access! This dichotomy between the amateur natural historian and the laboratory-bound scientist is growing as techniques get more sophisticated, and this is sad, but organizations such as the British Lichen Society can help set up a dialogue across this gap. Addresses are given not only for the BLS, but of societies in other countries, which is very appropriate as pollution knows no frontiers.

This is an invaluable reference book to an important area of scientific research, but its very breadth might put some people off. I would, however, recommend it as a good introduction to a fascinating topic.

Amanda Waterfield

Microscopic life in Sphagnum. Marjorie Hingley. Naturalists' Handbooks 20. Richmond Publishing Co., Slough. 1993. 64 pp. £13 hardback, ISBN 0 85546 292 2, £7.95, paperback, ISBN 0 85546 291 4.

The 150 species of bog-mosses of the genus *Sphagnum* are home to desmids and diatoms, flagellates and other protozoans, turbellarians and tardigrades, rotifers, gastrotrichs and assorted arthropods. This world in miniature is introduced to the reader with the aid of a clear text, workable keys and copious illustrations, some in colour. *Sphagnum* bogs are more commonly associated with the North and West, but London-based readers will welcome the reassurance that such habitats are still to be found in Hampshire, Surrey and other southern counties, often on nature reserves and safe from peat extraction.

The opening chapters describe the bogland habitat and the physical and chemical nature of the environment. The bog-moss plants themselves are for the most part inedible, but in the minute concavity of each leaf there is a film of water. Within this microhabitat, ever-varying in temperature, light intensity and pH, the *Sphagnum* community lives and reproduces, different organisms appearing with the changing seasons. To precede the identification section, there is a general account of the wealth of unicellular and sometimes even smaller multicellular life forms which are to be found. We learn, for example, of the testate, or case-dwelling, amoebae, a group in which many species are particularly associated with *Sphagnum;* of those other remarkable protists, the heliozoans or 'sun animals', of which some 20 species are known to live in this habitat; of the rotifers or 'wheel animals', which may be free-swimming or sedentary, their glass-like forms often of considerable beauty; and of the minute arthropods, not inhabiting the water film in the concavities of the leaves, but closely associated with the moss plants in the surrounding water. These range from cladocerans and copepods to an atypical, non-swimming, water-mite and over 60 species of oribatids.

The reader is invited to consider the many unanswered questions which acquaintance with the diverse and often striking life forms to be found in *Sphagnum* is likely to generate. How are different species distributed within the microhabitat or within a moss hummock? How do the animals survive adverse conditions and are they sensitive to pollution? Do they show any dietary selectivity of food items? There are useful pointers to collecting techniques and examination, to simple field experiments, the measurement of environmental factors, the counting of organisms and the estimation of diversity. Concluding with a valuable set of references for further study, this handy book is good value and a good read.

C. B. Ashby

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Instructions to contributors

Submission of papers

Papers relevant to the natural history and archaeology of the London Area should be submitted, **in duplicate,** to the editor, Mr K. H. Hyatt, c/o Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, before the end of January if they are to be considered for publication in the same year. However, the editor will be pleased to be contacted at any time to discuss possible contributions. Manuscripts should be typed, on one side of the paper only and with double spacing and wide (three cm) margins. Authors must retain a copy. Papers should include at the beginning an abstract, summary, or synopsis. **Sheets must be numbered.**

Text

Locality spellings should follow the latest editions of the maps published by the Ordnance Survey. Capitalization should be kept to a minimum. Common names of animals and plants must begin with lower-case initials, and **only** Latin names of genera and species must be underlined. When both common and Latin names are given there should be no brackets or commas separating them. **Genus names should appear in full where first used within each paragraph.** When scientific names are taken from a standard work, which must be cited, authorities should be omitted. In descriptive matter numbers under 10 should be in words, except in a strictly numerical context. Dates in the text should follow the logical sequence of day, month, year, i.e. 25 December 1971, but in lists as 25.xii.1971. Measurements should be in metric and follow the SI system (Système International d'Unités), with imperial equivalents in parentheses where appropriate. There should be no full point following Dr, Mr, Mrs or St. Lists should be in systematic, alphabetical or numerical order. **Hyphens should not appear at the ends of lines. Tables should be typed on separate sheets at the end of the text. Word-processed text should not use italic, bold or compressed typeface.**

References

Reference citation should be based on the Madison rules (in *Bull. Torrey bot. Club* **22:** 130-132 (1895)), except that a colon should always precede a page number. Capitalization in titles of books and papers in journals should be kept to a minimum. Journal titles should follow the abbreviations in the *World List of Scientific Periodicals* and be underlined. Book titles should also be underlined. Examples are as follows:

In text:

Meadows (1970 : 80) or (Meadows 1970).

In references:

MEADOWS, B. S. 1970. Observations on the return of fishes to a polluted tributary of the River Thames 1964–9. *Lond. Nat.* **49:** 76–81.

MELLANBY, K. 1970. *Pesticides and pollution.* Ed. 2. Collins, London.

WHITE, K. G. 1959. Dimsdale Hall moat, part II. *Trans. a. Rep. N. Staffs. Fld Club* **92:** 39–45.

Authors must ensure that all references are cited accurately: they will not be checked by the editor.

Illustrations

Distribution maps should be submitted in the form of a recording map with symbols in Indian ink and stencilled or by transfers e.g. 'Letraset'. Solid dots are used to indicate contemporary or recent presence, circles for old records and crosses (not pluses) for other information, such as introduced species. The caption should be written outside the frame of the map and will be set up by the printer.

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Photographs should be glossy black-and-white prints, of good contrast, preferably plate or half-plate in size, or, following consultation with the editor, in the form of colour transparencies, either 35 mm or larger. Colour prints are also suitable for reproduction in the text in black and white.

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